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THE PHILIPPINE
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THE ODONATA OF THE PHILIPPINES, II

SUBORDER ZYGOPTERA

By JAMES G. NEEDHAM and MAY K. GYGER
Of Cornell University, Ithaca

TWELVE PLATES AND TWO TEXT FIGURES

In the slender Odonata, commonly called damselflies, the wings of the two pairs are similar in form and elevated in repose. The head is transversely elongated, its outer prominences capped with hemispherical eyes. The abdomen in the male is equipped at the tip with two pairs of clasping appendages, and in the female always with an ovipositor beneath the terminal segments.

In venation nodus and stigma are as in the Anisoptera, but the relations of the veins behind the arculus are very different. Instead of triangle and supratriangle there is a quadrangle (text fig. 3, *4*, *6* to *10*) that is, the morphological equivalent of the two together extending outward in the axis of the wing. Below the quadrangle is a subquadrangle that is likewise the equivalent of the anisopterous subtriangle plus the space extending from it proximally to the anal crossing (Ac). The outer ends of the quadrangle and the subquadrangle are thus brought into line, forming a transverse brace two cells long that join veins M_4 and A. This connective is often a convenient mark. It is called the medioanal link (ma).

The nymphs of the Zygoptera are slender; often very slender, especially in the abdomen which does not contain a gill chamber, the gills being external. Generally there are three gill plates at the end of the abdomen with their edges set ver-

tically and their surfaces traversed by a rich network of respiratory tracheoles. Sometimes they are inflated, and sometimes heavily chitinized and bearing spinous ridges that are better adapted for defense than for respiration. In *Rhinocypha* the middle gill plate is rudimentary and the others are wholly chitinized.

In addition there are single pairs of ventral gills under the sides of the abdomen on segments 1 to 7 in many nymphs of the Agrionidæ (Plate 11, fig. 139).

Below is a list of the Philippine zygopterous Odonata known to us, with the known nymphs marked as before. Those herein first described are marked with a star, those heretofore known with a dagger. A dagger in parenthesis indicates that the nymph of another species of the genus is known, not the species following it.

AGRIONIDÆ

Euphæa cora Ris.
(*) *Euphæa refulgens* Sélys.
Euphæa amphicyana Ris.
Heterophæa ruficollis Ris.
Heterophæa barbata Martin.
Cyclophæa cyanifrons Ris.
(*) *Neurobasis luzonensis* Sélys.
(!) *Vestalis melania* Sélys.
Cyrano unicolor Sélys.
Rhinocypha turconii Sélys.
Rhinocypha semitincta Sélys.
(*) *Rhinocypha colorata* Sélys.
(!) *Libellago asiatica* Sélys.
(!) *Micromerus lineatus* Burmeister.
Devadatta argyoides Sélys.
Devadatta filipina sp. nov.

CŒNAGRIONIDÆ

(!) *Lestes concinna* Sélys.
Lestes præmorsa Sélys.
(!) *Drepanosticta lymetta* Cowley.
Drepanosticta halterata Brauer.
Drepanosticta myletta Cowley.
Drepanosticta megametta Cowley.
?*Drepanosticta lestoides* Brauer.
Drepanosticta septima sp. nov.
?*Protosticta annulata* Sélys.
Caconeura integra Sélys.
Caconeura obsoleta Sélys.
(*) *Rhinagrion philippinum* Sélys.
Cœliccia dinoceras Laidlaw.
Cœliccia brachysticta Ris.
(*) *Prionocnemis serrata* Sélys.
Prionocnemis cornuta Brauer.
Prionocnemis atropurpurea Brauer.
Prionocnemis erythrura Brauer.
Prionocnemis hæmatopus Sélys.
Prionocnemis ignea Brauer.
Prionocnemis flammea Sélys.
Prionocnemis appendiculata Brauer.
Prionocnemis rubripes sp. nov.
Argiocnemis rubeola Sélys.
(!) *Agriocnemis femina* Brauer.
Agriocnemis velaris Sélys.
Agriocnemis lunulata Sélys.
Moroagrion danielli sp. nov.
(!) *Ceriagrion coromandelianum* Fabricius.
(*) *Pseudagrion pilidorsum* Brauer.
Pseudagrion crocops Sélys.
Pseudagrion azureum sp. nov.
Pseudagrion microcephalum Rambur.
Pseudagrion flavifrons sp. nov.
Pseudagrion evanidum sp. nov.
Cœnagrion pendulum sp. nov.
Ischnura senegalensis Rambur.
(†) *Ischnura elegans* Lind.
Pericnemis incallida sp. nov.
Pericnemis bonita sp. nov.

Pericnemis mcgregori sp. nov.
Pericnemis flavicornis sp. nov.
Pericnemis cantuga sp. nov.
?*Pericnemis glauca* Brauer.
?*Pericnemis lestoides* Brauer.
?*Amphicnemis furcata* Brauer.
Teinobasis dentifer sp. nov.
Teinobasis filiformis Brauer.
Teinobasis filum Brauer.
Teinobasis filamentum sp. nov.
Teinobasis corolla sp. nov.
Teinobasis nigra Laidlaw.
Teinobasis strigosa sp. nov.
Teinobasis olivacea Ris.
Teinobasis samaritis Ris.
Teinobasis recurva Sélys.

A good bit of the material representing the commoner species has been collected by students in the course of class field work, most of the duplicates coming from Los Baños and vicinity. To name the collectors of all specimens under our account of each of these species would take up far too much space; yet we wish to give credit to all who have helped. To that end we list the names of all those not elsewhere accredited with more valuable material, as follows: F. T. Aala, Claudio Adam, Anselmo P. Afalla, Faustino Agcaoili, Domingo M. Alava, Juan M. Alacon, Antonio C. Alberto, P. E. Alcala, J. Amores, E. V. Andaya, I. Ang, S. H. Angel, V. P. Antonio, T. A. Araneta, Isaac J. Aristorenas, M. Oro, R. Asibal, Pedro Asico, Alvaro Asuncion, M. Asuncion, P. Asuncion, L. Alicbusan, M. Avila, Generoso E. Baladad, Alfredo Barrera, D. Batenga, P. R. Bautista, S. Belo, Victor Belo, A. D. Benitez, L. Boongaling, T. C. Briones, C. B. Brizuela, G. Bumagat, F. Butac, P. Cabreros, R. Cabahug, Esteban Cada, I. Cadeliña, E. Caguicla, M. Caguicla, M. Camero, F. A. Caña, M. O. Cañeda, Leon Capinpin, S. R. Capco, E. Carandang, Pedro Carbonell, J. Casa, O. Casupang, I. Cayañga, M. Cero, Juan Cinco, Felicidad Chan, B. P. Clark, P. D. Collado, Amado F .Costes, Cenon Flor Cruz, P. V. Cruz, N. Cuevas, B. Dalid, Manuel Dinglasan, Federico Deximo, F. Dumaguing, A. C. Duyag, G. E. Edwin, Pilar V. Elayda, Pablo Enrile, D. Eamilao, P. Erce, S. Estocapio, A. Evangelista, L. D. Fadullon, T. Faysan, A. C. Felix, F. Felix, D. Fermin, F. Fermin, Andres B. Fernandez, Felix Flores, F. de Leon Flores, O. Fontanilla, W. Figueroa, P. C. Gabertan, J. Galapon, Celerino Gariando, R. B. Gines, J. Gironella, P. Gloria, J. Goguly, S. S. Gonzales, T. S. Gonzales, Rodolfo Guerrero, R. Guillem, Justino Guiyab, Fortunato Guzman, H. Hadden, J. T. Hernandez, A. Hilario, S. Inumerable, Onpel S. It, Kan Jalavicharana, Antero T. Jocson, Bartolome Javier, V. Juan, Elias Lantion, C. Las Marias, B. Legaspi, Isidro Macaspac, Vicente Madrigal, Felix Madrid, P. A. Magana, C. Magno, A. Malabayabas, P. D. Malang, Caesar Mamon, S. Manaig, C. G. Manuel, P. Macariola, Onofre Martin, Luciano

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Key to the genera of Philippine Zygoptera.

ADULTS

1. Wings with more than five antenodal crossveins..... 2. AGRIONIDÆ.
   Wings with but two antenodal crossveins..... CŒNAGRIONIDÆ.
2. Arculus nearer to nodus than to wing base and with its two sectors arising from its upper (anterior) end..... *Devadatta.*
   Arculus nearer to wing base than to nodus, and with its sectors arising from middle or nearer its lower end..... 3.
3. Vein M_4 not arched forward from end of quadrangle, M_4 and Cu_2 strongly divergent at edge of wing..... 7.
   Vein M_4 arched forward from end of quadrangle, M_4 and Cu_2 convergent at edge of wing..... 4. LIBELLAGINÆ.
4. Middle fork (Mf)[1] askew forward..... 5.
   Middle fork symmetrical or askew backward..... *Micromerus.*
5. Stigma bordered behind by three cells..... *Libellago.*
   Stigma bordered behind by five or more cells..... 6.

[1] The arculus with the two sectors springing outward from it is always easily recognized, and the middle fork is always the first fork in the upper sector of the arculus.

FIG. 3. Venational characters of odonate wings. *1*, Principal veins and their connection; *2*, *Cordulegaster sayi*, wings; *3*, gomphine wing base, male; *4*, libelluline wing base; *5*, arculus and its sectors (M_{1-3} M_4); *6*, *Cyanocharis valga*, forewing; *7*, *Caliphæa consimilis*, part of wing base; *8*, *Telebasis salva*, forewing; *9*, *Telebasis salva*, part of wing base; *10*, *Anomalagrion hastatum*, stigma, female with brace vein *x*.

ABBREVIATIONS

A, Anal vein; *Ac*, canal crossing; *Al* or *al*, anal loop; *an*, antenodal crossveins; *ap pl*, apical planate; *ar*, arculus; *b*, basal subcostal crossvein; *br*, bridge; *Bs*, midbasal space, space before the arculus; *brs*, basal radial space; *C*, costa; *Cu*, cubitus; *g*, gaff (fused portion of vein Cu_2 and A_1); *h*, hypertriangular space; *M*, media; *m*, membranule, bordering the 3-celled anal triangle of the male hind wing; *ma*, mediоanal link; *mf*, middle fork; *mpl*, median planate; *mr*, midrib (bisector of anal loop); *n*, nodus; *o*, oblique vein; *p*, patella; *q*, quadrangle; *R*, radius; *rm*, radial sector; *rpl*, radial planate; *s*, subtriangle; *Sc*, subcosta; *set*, sector of the arculus; *sn*, subnodus; *sq*, subquadrangle; *st*, stigma; *t*, triangle; *tr pl*, trigonal planate; *u*, point at which petiolation (stalk) of wing base ceases; *x*, brace vein to stigma.

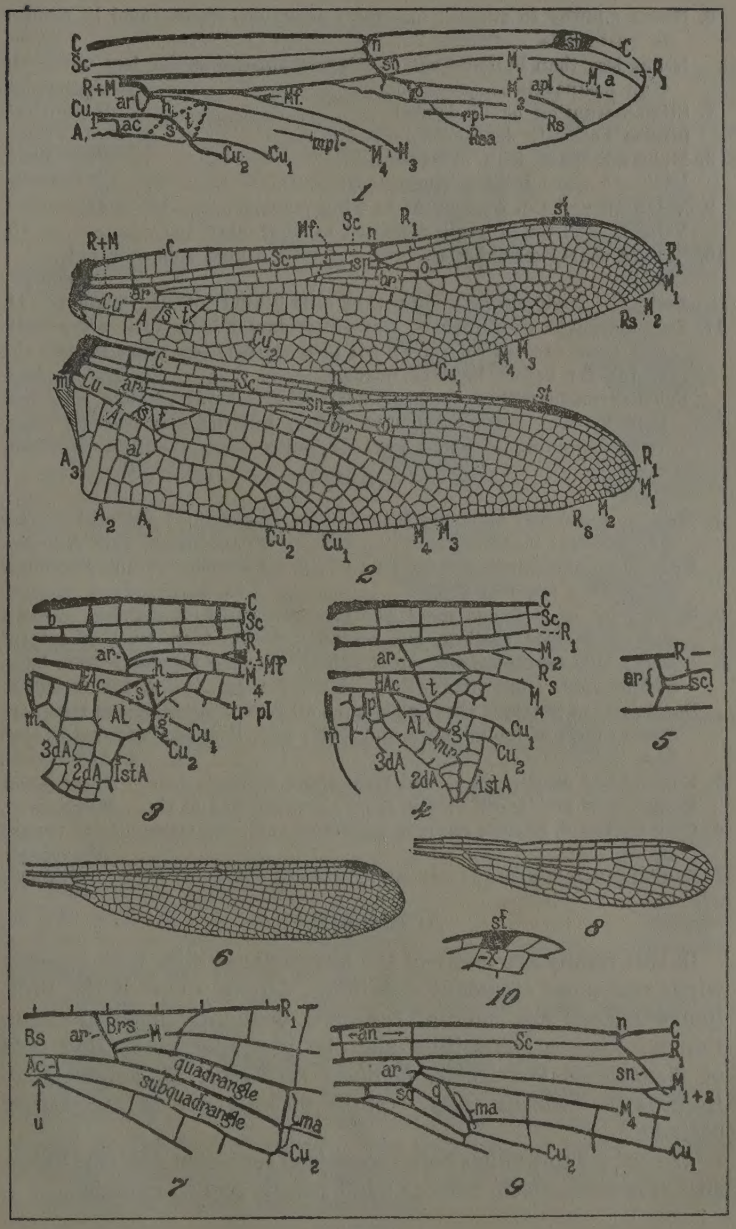
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Fig. 3.

6. Nodus midway to stigma; antenodal crossveins about equal in number to postnodals ..... *Cyrano.*
   Nodus less than halfway out to stigma: antenodals far less numerous than postnodals ..... *Rhinocypha.*
7. Stigma wanting or ill defined..... 8. AGRIONINÆ.
   Stigma normally developed..... 9. EPALLAGINÆ.
8. Midbasal space with crossveins..... *Neurobasis.*
   Midbasal space lacking crossveins ..... *Vestalis.*
9. Veins M_4 and Cu_1 convergent to wing margin..... *Cyclophæa.*
   Veins M_4 and Cu_1 strongly divergent to wing margin..... 10.
10. Sectors nearly straight; two rows of cells behind subquadrangle. *Dysphæa.*
    Sectors strongly curved; one row of cells behind subquadrangle..... 11.
11. Subquadrangle with four or five crossveins; middle fork (*Mf*) halfway from arculus to nodus; cell increase between veins M_4 and Cu_1 begins far before level of nodus..... *Heterophæa.*
    Subquadrangle with not more than two crossveins; middle fork less than halfway from arculus to nodus; cell increase between these veins beginning at about level of nodus..... *Euphæa.*

NYMPHS

1. Gills on abdominal segments 1 to 7; basal segment of antennæ shorter than segment 2..... EPALLAGINÆ, only *Euphæa.*
   No gills on abdominal segments 1 to 7; basal segment of antennæ much longer than segment 2..... 2.
2. Basal joint of antennæ much shorter than entire remainder: median cleft of labium shallow, not reaching deeper than level of lateral lobes; gills represented by stout spines, tapering regularly from base, middle spine rudimentary..... 3. LIBELLAGINÆ.
   Basal joint of antennæ about as long as all remaining segments together; median cleft of labium deep and wide; gills long and widened beyond base ..... 4. AGRIONINÆ.
3. Rudiment of middle gill viewed from above a simple cone.... *Rhinocypha.*
   Rudiment of middle gill viewed from above notched at tip..... *Micromerus.*
4. Gills thickened, laterals strongly triquetral and spatulately dilated toward tip ..... *Neurobasis.*
   Caudal gills all thin and not dilated toward tip..... *Vestalis.*

AGRIONIDÆ

In this family are many of the larger damselflies with broader wings and more abundant venation. Among those of the Philippine Islands are some of the most brilliantly hued of living things. The rainbow tints and the gleaming green and gold of *Neurobasis luzonensis, Euphæa refulgens, E. amphicyana, Rhinocypha colorata,* and *Vestalis melania* are of surpassing beauty.

The three subfamilies here recognized represent extreme diversity in specialization, both as adult insects and as nymphs.

Genus SUPHÆA Rambur

This genus is represented in the Philippines by three good species; *refulgens* Sélys, *amphicyana* Ris, and *cora* Ris. The validity of *E. Semperi* Sélys is extremely doubtful; de Sélys questioned it. We have before us a series of *refulgens*, grading perfectly into the characters by which he separated *semperi*, and we are deterred from declaring it a synonym only by the fact that we have not seen the type specimen.

Among the hundred or more specimens of *refulgens* before us there are eight more or less definite types of color pattern, ranging from that of *semperi* through that of typical *refulgens* to one with the wings almost half hyaline. The eight variants shown in text fig. 4 grade into each other through degrees of obfuscation. The male appendages of all are practically alike, and all discoverable minute variants in them have been found in one locality (Los Baños).

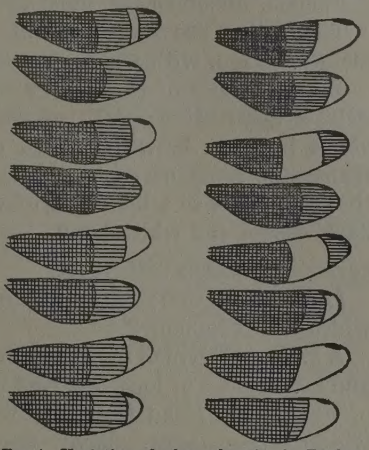


FIG. 4. Variation of wing coloration in *Euphæa refulgens* Selys. Crosshatching indicates metalic color; linear shading, nonmetalic obfuscation; and clear areas, hyaline.

Key to the species of Euphæa.

MALES

1. Wings wholly or partly infuscated ..... 2.
   Wings hyaline ..... *cora.*
2. Both wings dark in major portion ..... *refulgens.*
   Front wings hyaline, hind wings dark ..... *amphicyana.*

EUPHÆNA CORA Ris. **Plate 12, figs. 156 and 157.**

Euphæa cora RIS, Mitt. Münch. Ent. Ges. 20 (1930) 86, Mindanao, Surigao Province.

Length of hind wing of male 25.5 mm.

We have before us one specimen of *cora* from Zamboanga Province. It is easily distinguished from the other Philippine species by the hyaline wings. The tip of the abdomen is badly crushed, so our figure is of necessity a partial reconstruction.

The female has not been described.

EUPHÆA REFULGENS Sélys. Plate 11, figs. 136 and 140; Plate 12, figs. 152 and 153.

SÉLYS, Synop. Calopt. (1853) 53, male, Luzon, Manila; Mon. Calopt. (1854) 181; Bull. Acad. Belg. (2) 47 (1879) 375, female; tom. cit., 376 (as *E. semperi*, Manila).

Male, abdomen 35 mm; hind wing, 30.

Female, abdomen, 31 mm; hind wing, 31.5.

The males are gorgeous insects. The wings are brilliant metallic green, with violet reflections.

Forty females of *refulgens* from various localities agree with Sélys's description: Base of forewings obfuscated to a point about halfway between nodus and stigma, where there is a transverse band of milky white about three millimeters wide, thence hyaline to stigma, tip of wing dusky; hind wing entirely dark except for white band.

EUPHÆA REFULGENS Sélys. Nymph.

Length, 17 mm; gills, 7; abdomen, 8; width of head, 4; width of abdomen, 3.

A stocky brownish nymph with large, baggy, pilose caudal gills and seven pairs of long tapering ventral gills trailing under sides of abdomen. Head but little wider than long, flattish above, widest across eyes, slowly narrowed behind to the broadly rounded hind angles. The broad excavation of the occipital margin is sharply carinate where it fits against a dome-shaped projection of the prothorax. Relative lengths of segments of antennæ 5 : 10 : 6 : 7 : 6 : 5 : 4. Front of head below antennæ scabrous, above antennal bases slightly swollen. The deeply serrate outer edges of mandibles visible from above head.

Labium short and stout, its hinge reaching backward to mesothorax. Side margins of mentum convex, in outer half sharply serrate with appressed hairs arising singly, one under each tooth. Median lobe of mentum produced, dome-shaped, with a minute goblet-shaped median notch (open at the bowl, closed down the stem of the goblet), lateral border beset by microscopic retrose serrations. Lateral lobes small, beyond outcurving base nearly parallel-sided, outer margin beset with microscopic clavate hairs; movable hook stout; between its base and the short truncate end hook two terminal hooks, the inner two-fifths and the outer one-third as long as movable hook; inner margin of lobe almost smooth. Outer hump on mandible armed with about ten strong teeth, whose concave sides shelter single clavate hairs of possibly sensory function.

Prothorax depressed, disc shield-shaped, about twice as broad as long, narrowed in front to an anterior lobe that is set off by a shallow groove, and broadly rounded behind; beneath its

smooth and convex lateral margins the bulging sides thickly beset with short stout spinules. Synthorax and wings concolorous, the latter reaching rearward to end of abdominal segment 6. Legs concolorous, stout; femora flattened. On hind margin of middle and hind femora and tibiæ a line of long tawny hairs.

Abdomen rounded above, expanded at lateral margins into segmental lobes that overlie bases of corresponding ventral gills. These gills on segments 1 to 7, single, pale, tinged with purplish, each longer than width of abdomen, bent backward at base and thence regularly tapering to slender tips. The usual caudal gills (perhaps not gills in function) hairy especially at the ends, enormously swollen in their basal three fifths, thence suddenly contracted to slender taillike tips. Swollen portion ovoid, flattened on opposed surfaces as if by mutual compression.

The depressed front, flattened femora, short stout claws, and trailing position of the ventral gills, are all signs of a lotic source, and some of the numerous specimens are labelled "Molawin Creek, Los Baños, June 26, L. B. Uichanco". The others labelled "Los Baños" are perhaps from the same source.

EUPHÆA AMPHICYANA Ris. Plate 12, figs. 154 and 155.

RIS, Mitt. Münch. Ent. Ges. 20 (1930) 89, male, Mindanao, Surigao Province.

Male, abdomen, 38 mm; hind wing, 31.

We have four specimens of *E. amphicyana* from Zamboanga and Cotabato Provinces. The anal appendages are of the same general type as in *refulgens*, but are clearly distinct (Plate 12, figs. 154 and 155.).

HETEROPHÆA RUFICOLLIS Ris.

RIS, Mitt. Münch. Ent. Ges. 20 (1930) 90.

This species we have not seen. It appears to be known only from the male type specimen from Inyauan (Imugan?), Luzon. It is a rather large (hind wing 42 mm) black and red species. The rather narrow hyaline wings are tipped with brownish beyond the stigma. The species will be recognized by the bright red color of prothorax and abdomen, and by the venational characters stated in our key to genera.

Nymph unknown.

HETEROPHÆA BARBATA Martin.

MARTIN, Bull. Mus. Hist. Nat. (1902) 507, Luzon, Manila, June; RIS, Mitt. Münch. Ent. Ges. 20 (1930) 90.

This species we have not seen. It is known from a single male specimen. It is about the size of the preceding (abdomen,

55 mm; hind wing, 41). The color pattern of the prothorax is said to be more black than red, whereas in *H. ruficollis* it is more red than black.

CYCLOPHÆA CYANIFRONS Ris. Plate 12, fig. 158.

Ris, Mitt. Münch. Ent. Ges. 20 (1930) 81, figs. male and female, Binalaun, northern Palawan.

This species we have not seen. It is a blackish slender species of moderate size (male, abdomen 36 mm; hind wing, 30.5; female, abdomen, 30 mm; hind wing, 29). Plate 12, fig. 158, is a copy of Ris's figure of the remarkable process of the wall of abdominal segment 2 in the male. This figure, together with the venational characters given in our key, should be sufficient for the recognition of this species.

NEUROBASIS LUZONENSIS Selys. Plate 13, figs. 159, 161, 162, 164, 165, and 176.

SÉLYS, Bull. Acad. Belg. (2) 47 (1879) 360, Luzon; An. Soc. Esp. Hist. Nat. 11 (1882) 19, as a race of *N. kaupii*.

One of the most beautiful of damselflies; body shiny green above, yellowish beneath, forewings subhyaline, hind wings in male dark with violet reflections above and green reflections beneath, in the female translucent golden amber. Unique among Philippine Zygoptera in having midbasal space of wings traversed by numerous crossveins.

One specimen was sent in 1918 from Magdalena, Luzon, by Dr. L. G. McConachie. Others have since been received at numerous times and from many collectors in Luzon and in Mindanao. *Neurobasis luzonensis* is undoubtedly a common lotic species.

NEUROBASIS LUZONENSIS Sélys. Nymph.

Length, 22 mm; antennæ, 12; gills, 15; hind femur, 10. Width, head 4 mm; abdomen, 3.

A remarkably elongate, long-legged, sprawling nymph with antennæ about three times as long as head, and with a labium that is mostly a rim for a wide diamond-shaped median cleft. Coloration mainly pale, marked with brownish. Head squarish, bare except for the four cornæ which are truncate at neck, with prominent eyes at middle of sides. Antennæ with an enormous basal segment, about twice as long as remaining six segments together, brownish, regularly tapering from base outward, square in cross section, clothed with microscopic, outwardly directed spinules. Labium slender, parallel-sided in its basal half, then suddenly widened to base of long, linear, lateral lobes, and divided more than half its length by an enormous wide median cleft that is encircled distally by the thin, con-

vergent, linear, incurving sides of the median lobe. The ends meet a little beyond level of tips of lateral lobes. Midway of their length each armed with a single marginal spinule. Movable hook slender, moderate in length, end hook half as long; two other hooks of terminal border intermediate between these in length.

Two broad pale stripes beginning on rear of head and extending back to wing roots, the brown median band between them divided by a pale middorsal line. Legs pale. Femora with two, tibiæ with three brownish bands. Basal half of femora marked with two lines of numerous pale brownish dots. Wings in this specimen reaching backwards only to abdominal segment 4.

Middle abdominal segments of equal length, end segments diminishing in length in about the proportions 10:8:7:6. Dorsum with a submarginal pale band each side and with four brown dots ranged across apical border, these becoming larger and more distinct to rearward. Gills brownish, with extreme tips paler and with obscure paler crossbands, two on lateral, one on median gill. Crossbands thin, translucent, laterals T-shaped in cross section, median crossband T-shaped. Crossbands widened from base almost to tip, median crossband most widened and about one-fourth shorter than laterals.

LUZON, Laguna Province, Mount Maquiling, Molawin Creek, June 9, 1932, altitude 200 feet.

VESTALIS MELANIA Sélys. **Plate 12, figs. 166 and 167.**

SÉLYS, Bull. Acad. Belg. (2) 35 (1873) 474, Luzon; ibid. 47 (1879) 360, Luzon, Mindanao; An. Soc. Esp. Hist. Nat. 11 (1882) 19, Mindanao; ibid. 20 (1891) 213, Dolores, Angat.

This very broad-winged damselfly (male, front wing, length, 35 mm; greatest width, 13) is wholly blackish in appearance until the light falls obliquely on the upper surface of the wings; then they fairly sparkle with the richest tints of metallic blue, with a touch of shiny green and golden at the extreme base. This species is easily recognized by the venational characters given in the key; the intercalary veins are all hitched on to the principal veins in such a manner that the latter appear to be repeatedly forked.

LUZON, MINDANAO, and SAMAR, 51 males and 39 females. (*H. C. Muzzall, A. C. Duyag, C. F. Baker, B. P. Clark, G. E. Edwin, R. Cabulig,* and *G. O. Palis.*

The nymph differs from all other known agrionine nymphs in having the three caudal gills thin and platelike, much as in the Cœnagrioninæ. It has been adequately described and

illustrated by Ris (1912) for *V. luctuosa*.[2] No nymphs of the Philippine species have come to us.

Genus CYRANO novum

Allied to *Rhinocypha* but differing markedly therefrom in stature, in proportions of wing, and in shape of face. Body very stout, swollen basal abdominal segments broadly depressed.

Eyes less wide apart than in *Rhinocypha*, the very thick prominence of face more broadly rounded and less projecting. Postclypeus wider than long, transversely ridged rooflike across middle, sloping forward down to its free border above labrum (which it does not surpass) and backward down into the deep furrow where it meets the frons.

Nodus much farther out in wing than in *Rhinocypha*, being halfway to stigma, ante- and postnodal crossveins approximately equal in number (postnodals often more than twice as numerous as antenodals in *Rhinocypha*). Front and hind wing margins parallel for about half wing length. Wide middle fork (Mf) strongly askew forward, vein M_2 arising a little (sometimes a cell length) beyond subnodus.

Type, *Rhinocypha unicolor* Sélys.

CYRANO UNICOLOR Sélys. Plate 12, figs. 149 and 150; Plate 20, fig. 290.

SÉLYS, Bull. Acad. Belg. (2) 27 (1869) 665, female, Manila.

Male, abdomen, 22 mm; hind wing, 27 to 28.

Female, abdomen, 20.5 mm; hind wing, 29 to 30.

This species appears not to have been described hitherto, but merely named, with measurements stated for a single female specimen in Dr. Hagen's collection and with remarks upon its large size. Name and measurements were communicated to de Sélys, who did not see the specimen.[3] The name doubtless refers to the clear wings—another anomaly for *Rhinocypha*. The species is well represented in the collections before us.

Head of adult male deep uniform black with a pair of cuneiform pale spots just lateral to paired ocelli and a pair of round pale spots on occiput (scarcely visible on old specimens). Labium, labrum, anteclypeus, frons, and occiput hispid.

Prothorax black, posterior lobe clad with long black hairs. Synthorax velvety black with a few touches of metallic violet. Dorsum, ventral half of sides, and venter hispid. Legs long,

[2] Tijd. v. Entomol. 55 (1912) 177, pl. 8.

[3] Our determination of this damselfly was corroborated by a comparison with the type kindly made for us by Dr. Nathan Banks.

slender, black, armed with an abundance of long spines. Wings hyaline, with a very small amount of obfuscation at extreme base. Veins black, stigma darkest brown. Ante- and postnodals about eighteen or nineteen each. Quadrangle traversed by three or four crossveins, subquadrangle usually by four or five.

Abdomen rather stout. In younger specimens it is slightly metallic brick-red on the dorsum of segments 2 or 3 to 8 with black lines on all carinæ; somewhat darker, more brownish red on venter; in very old specimens, entirely black with metallic violet reflections on dorsum. The strong lateral carinæ of segments 3 to 8 inclusive are slightly indicated on segment 2. A prominent dorsal ridge runs from the end of segment 2 to the middle of segment 9.

Anal appendages black; superior slightly dilated inwardly near tip. Inferiors much swollen basally, a little more than half as long as superiors, strongly toothed at tip, internally cleft with the supra-anal plate, vertically inclined, lying in cleft.

Teneral specimens much paler, on head and thorax a prominent pattern of dark brown and yellow. Two broad and conspicuous yellow stripes fill the wide vertical grooves that lie between the prominence of the face and the eyes. These stripes bare, thus standing in contrast with black hairy prominence, following eye margin upward, and narrowing to a point at level of ocelli. Three pairs of small isolated yellow spots in black on top of head; the larger pair between ocelli and eyes, the other two pairs in a single crossline farther back, inner pair minute.

Black dorsum of thorax divided by a yellow antehumeral stripe that is interrupted on both pro- and mesothorax. On sides of thorax two lines of yellow spots, three small elongate spots above, two of these beneath subalar carina, the third farther forward; two big angulate yellow blotches below, one of these extending down to middle coxa, the other up to base of hind wing. Venter mainly yellow, with brown on the front of each coxa, and in cross streaks between coxæ. Behind rear coxæ two more cross streaks of brown, rearmost streak in an area that is densely hairy.

Abdomen with large yellow spots on sides of two basal segments, only carinæ on segments 8 to 10 and appendages black. Remainder pale or with varying degrees of darkening according to age.

Female colored like younger male in head and thorax, but on abdomen narrow areas along longitudinal carinæ yellowish on segments 2 to 6, and round yellow spots persisting in middle of

black sides of segments 8 and 9. Appendages and apical segments otherwise black in mature specimens.

LUZON, Tayabas Province, Quezon Park, 12 males and 4 females (*F. Juan*); Zambales Province, Amiling, 1 male: Laguna Province, Mount Maquiling, 5 males and 3 females (*C. F. Baker*); Ube, 2 males (*McGregor* and *Celestino*); Los Baños, 7 males and 4 females; Mount Banahao, 5 males and 2 females (*G. A. Pangga*); Cavite Province, Indang, 1 male (*P. Erce*); Alfonso, 1 male (*M. Rosell*).

Nymph unknown.

Genus RHINOCYPHA Rambur

Of this large and widely distributed Oriental genus of small, broad-winged damselflies two brilliantly colored species, *R. colorata* and *R. semitincta,* are very common in the Islands, and a third, *R. turconii,* less common and known hitherto from the male only, is represented in the collections before us by specimens of both sexes.

Sélys [4] records a fourth species, *R. tincta,* from Manila. Kirby [5] does the same. These authors are probably in error, as most specimens collected in the East Indies were shipped from Manila or Singapore. *R. tincta* seems not to occur in the Philippine Islands.

The two first-named, *R. colorata* and *R. semitincta,* are very close together and possibly are not distinct, although from the material at hand we believe them to be. In the females of both the extreme tips of the hind wings are milky white—in *semitincta* the forewings also have this opaque edging. In *colorata* females the wings are a rather washed-out brownish with a narrow band of darker brown just behind the milky area, connected on the hind margin with a broader band of brown about halfway between nodus and stigma. The forewings of *semitincta* females are dark brown from well before the nodus to a point a little before the stigma, thence hyaline to the white tips; the hind wings are dark, lacking this clear area. The coloration of the wings of the males of *colorata* is quite variable, but it rarely starts as far proximad in the wings, or has such a pronounced angle in the middle of the wing as that of *semitincta.* The tips of the forewings of *colorata* nearly always have a lighter area, while the color is uniform in *semitincta.*

[4] Syn. Cal. (1853) 54.
[5] Cat. Neur. Odon. (1890) 114.

Usually, also, the metallic coloring in *semitincta* is much more brilliant.

The lustrous iridescence of the broad colored area of the wings—brilliant metallic blue changing to green and gold and purple—is very beautiful.

Key to the species of Rhinocypha.

1. Front wings colored ..... 2.
   Front wings hyaline..... *turconii.*
2. Inner margin of colored area in wings of male with a strong reëntrant angle several cells proximad of nodus; abdominal segment 10 deeply excavate dorsally; wings of female dark brown..... *semitincta.*
   Inner margin usually entirely distal of nodus and without a strong angle; abdominal segment 10 slightly excavate dorsally, wings of female pale brown ..... *colorata.*

RHINOCYPHA TURCONII Sélys. Plate 12, figs. 147 and 148.

SÉLYS, An. Soc. Esp. Hist. Nat. 20 (1891) 215, male, Panay, Cebu.

Male, abdomen, 18 mm; hind wing, 23 to 25.

Female, abdomen, 17 mm; hind wing, 24.

This species is easily separated from the two following by the wing pattern. The forewings and the proximal two-thirds of the hind wings are hyaline with the distal third of the latter sharply marked off, black in the male, and pale brown in the female, hitherto undescribed.

Female.—Head black with yellow-cream markings as follows: A large triangular spot on base of each mandible, a similar spot on the posterolateral corners of snout, a narrow line against anterior margins of eyes, a pair of small round spots just behind and lateral to the paired ocelli, another similar pair behind and lateral to ocelli.

Prothorax black, with cream-yellow spots on sides. Synthorax black with a long slender dusky yellow humeral dash, followed in the same line with a small cuneiform spot, a broad basal yellow stripe starting on hind margin of middle coxæ and running back to abdomen. Legs black exteriorly, powdered with white on inside. Forewings subhyaline, saffron-stained to level of stigma, hyaline below and beyond it. Hind wings same as forewings to a point about halfway from nodus to tip of wing, from there on washed with brown with a large round clear spot in center of dark and a tiny tip of opaque white on most distal point of wing. Ante- and postnodal crossveins 12 : 27 and 13 : 18 in forewing and hind wing, respectively.

Abdomen black, with yellow band from thorax continued in a broken and diminishing line down the side—broken into a dash and a dot on segments 2 to 5, three medium dots on segment 6, and three very small dots on segment 7, absent thereafter. A ventral distal margin of yellow on segment 8.

Male.—Forewings wholly subhyaline with only a tinge of brown across extreme apical margin. Apical third of hind wings opaque blackish brown, sharply defined. Hind wings dilated in apical half, much broader than forewings, and tapering regularly from near base of stigma to base.

MINDANAO, Zamboanga Province, Kabasalan, 9 males (*H. C. Muzzall*). LUZON, Laguna Province, 1 male and 1 female, collector unknown; Mount Banahao, 1 male, *G. A. Pangga.*

RHINOCYPHA SEMITINCTA Sélys. Plate 12, figs. 145 and 146.

SÉLYS, Bull. Acad. Belg. (2) 27 (1869) 664, male and female, Moluccas; ibid. (2) 35 (1873) 491; An. Soc. Esp. Hist. Nat. 11 (1882) 20, Mindanao; ibid. 20 (1891) 213.

Male, abdomen, 17 mm; hind wing, 21.

Female, abdomen 18 mm; hind wing, 21.

MINDANAO, Cotabato Province, Kidapawan, 6 males and 2 females (*B. P. Clark*); Zamboanga Province, Kabasalan, 12 males and 17 females (*H. C. Muzzall*).

RHINOCYPHA COLORATA Sélys. Plate 11, figs. 131 to 135; Plate 12, figs. 141 to 144.

SÉLYS, Bull. Acad. Belg. (2) 27 (1869) 664, males, Luzon, Manila; ibid. (2) 35 (1873) 489; tom. cit., 490, as *R. frontalis;* ibid. (2) 36 (1873) 615 as *R. albistigma;* ibid. (2) 47 (1879) 395; An. Soc. Esp. Hist. Nat. 11 (1882) 19, Luzon, Cebu, Bohol, eastern Mindanao, up to 1,300 meters; ibid. 20 (1891) 214, Dolores and Sibul.

Male, abdomen, 16.5 mm; hind wing, 21.

Female, abdomen, 17 mm; hind wing, 21 to 24.

One thousand seven hundred males and females from practically all localities and collectors.

RHINOCYPHA COLORATA Sélys. Nymph (supposition).

Length, 12 mm; tail, 5; antennæ, 4; abdomen, 7.5; hind femur, 4.

Width, head, 3; abdomen, 3.

This smooth nymph has the body linear, moderately depressed, with banded appendages and spine-tipped abdomen. Head subtriangular, widest across rear of eyes, suddenly narrowed behind eyes to rounded hind angles and a deeply excavate occipital margin. On each hind angle is a prominent nipple-shaped

tubercle below which are scattered minute prickles. Antennæ brownish, with a pale ring on a long basal joint that nearly equals in length all joints that follow. Labium flat, its hinge reaching back to mesothorax; labial mentum evenly narrowed from lateral lobes backward to hinge; labial front border slightly produced and roundly bilobed. Three pairs of brown marks on its pale surface, one pair on lateral lobes externally, one pair at their bases, one pair at sides of median cleft. Movable hook on end of lateral lobe longer than any of four similarly curved terminal hooks below it. The innermost terminal hook is the end hook, which has a subtruncate tip. On the flat under surface of head beneath the eye runs a longitudinal carina that is beset with stout spinules.

Prothoracic disc brownish, with a broad median pale stripe, suddenly widened behind middle in a pair of prominent lateral tubercles, between which is a smaller pair of tubercles. Median pale stripe continued rearward to end of abdomen. Femora light brown, thrice ringed with paler; remainder of legs pale. Wing cases reaching rearward to middle of abdominal segment 6. Developing venation in wings with fourteen ante- and thirty postnodal crossveins.

Abdomen depressed, linear, a little narrowed on last two segments, both of which bear stiff spines at their posterolateral angles. Middle gill rudimentary, represented by a conic point surmounting a subtriangular plate hardly longer than wide. Two laterals long, tapering, sharply triquetral, margins beset with stout spines intermixed with slender hairs. Laterals brownish banded with pale in middle and at tips.

Two well-grown specimens from Molawin Creek, Los Baños, June 26, 1926, from *Dr. L. B. Uichanco.*

While not reared, these nymphs agree in number of nodal crossveins with *colorata* and not with *turconii,* the other local species.

LIBELLAGO ASIATICA Sélys.

SÉLYS, Bull. Acad. Belg. (2) 47 (1879) 384, male, female, Luzon, Mindanao; An. Soc. Esp. Hist. Nat. 11 (1882) 20, Luzon, Mindanao; ibid. 20 (1891) 216, Dolores.

Abdomen, 21 to 22 mm; hind wing, 18 to 19.

We have no specimens of this small species. It is clear-winged, with scantier venation than *Rhinocypha,* and differs further in having vein M_4 zigzagged beyond the quadrangle.

MICROMERUS LINEATUS Burmeister.

BURMEISTER, Handb. d. Ent. 2 (1839) 826; FRASER, Fauna Br. Ind. 2 (1934) 60 (full bibliography).

Hind wing, 16 to 20 mm.

This species, not as yet reported from the Philippines, is known from Formosa and Borneo, and it thus being found on either side of the Islands we have included the genus in the key. It is a slender pale species with wings stalked halfway out to the quadrangle and with only five or six antenodal crossveins. It is unique in our fauna in the skewness to rearward of the middle fork (Mf), and in the remarkable slant of the medioanal link (ma). By these characters it should be easily recognized.

Its nymph was figured by Fraser [6] and the figure was copied by the senior author in his Manual of the Dragonflies of China, plate 17, fig. 4.

DEVADATTA ARGYOIDES Sélys.

SÉLYS, Bull. Acad. Belg. (2) 7 (1859) 449, male, Singapore (in *Tetraneura*); An. Soc. Esp. Hist. Nat. 11 (1882) 20, Mindanao and Basilan; KIRBY, Syn. Cat. Neur. Odon. (1890) 111.

Male, abdomen, 31 mm; hind wing, 27.

Female abdomen, 25 mm; hind wing, 24.5.

Female hitherto unknown.

Female.—Head a rather uniform gold-brown. Labrum a little lighter with a fine line around free margin and one darker line a little behind and paralleling it. Labrum line between post- and anteclypeus, and excavate margin of occiput all with a sparse fringe of stout hairs.

Prothorax gold-brown, touched with black on tip of anterior lobe and on posterolateral margins. Synthorax of same general color, a little darker on dorsum, with three lighter stripes on the sides—one antehumeral, one on suture between segments, and one on metepisternum. Femora pale, twice ringed with darker, tibiæ and tarsi darker. Femora, tibiæ, and tarsi armed with two rows of strong spines, those on lower half of outer row on fore tibiæ very closely set and shorter than the others. Claws bifid at tip. Wings hyaline, very faintly stained with brown at extreme tip, intercalary sectors more hooked at posterior wing margin in forewing than in hind wing. Stigma evenly yellow. Ante- and postnodals 7 : 27 and 8 : 19 in forewing and hind

[6] Journ. Bom. Nat. Hist. Soc. (4) 32.

wing, respectively. First four antenodals continuous with second series in forewings, first five continuous in hind wings.

Abdomen brown, basally ringed with a fairly broad band of paler on segments 2 to 7. Sheath of ovipositor externally finely denticulate.

Male.—Head metallic steel-colored marked with livid. Thorax black, striped with livid. Abdomen marked as in female.

LUZON, Laguna Province, Los Baños, one female.

DEVADATTA FILIPINA sp. nov. Plate 13, figs. 160, 168, and 169.

Male, abdomen, 35 mm; appendages, 1.5; hind wing, 31.5. Female, hind wing, 31.5.

Male.—Head black, with metallic green and violet iridescence, somewhat swollen behind eyes.

Prothorax dark brown, bordered behind with black. Posterior lobe entirely black, point of anterior lobe black. Synthorax black, with a pale spot directly below base of forewings, a narrow pale line on suture between meso- and metathorax; a pale spot at upper anterior corner, base and lower half of anterior margin pale, a pale stripe on middle of posterior border of metepimeron. Legs long, armed with strong spines; femora rather pale, tibiæ and tarsi darker; claws bifid at apex. Wings narrow, strongly petiolate, hyaline, margined at tips with dark brown, more broadly so in forewings than in hind wings. Stigma almost black, a trifle paler distally. Ante- and postnodals 10 : 33 and 8 : 28 in forewing and hind wing, respectively.

Abdomen black; segment 1 dark brown except for margins; segments 2 to 7 basally ringed with paler, narrower on segment 2; segment 8 showing some vestiges of this ring; superior appendages black, twice as long as segment 10; inferiors dark brown, less than a quarter the length of superiors.

Female.—Head black, metallic, paler behind vertex.

Prothorax brown, darker basally; posterior lobe black, bordered posteriorly with pale brown. Synthorax dark brown, with a pale line on each lateral suture and a pale spot in anterior dorsal corners of meso- and metepimera. Legs as in male. Wings hyaline, fuscous beyond stigma. Stigma proximally dark brown, distally creamy. Ante- and postnodals 9 : 34 and 9 : 27 in forewing and in hind wing, respectively.

Only first three segments of the abdomen present, dark brown. Segment 1 apically bordered with black, segment 2 narrowly

basally ringed with pale, segment 3 more broadly basally ringed with pale brown, with a round spot of creamy yellow in middle of each side of pale ring.

Allotype, female, Mindanao, Bukidnon Province, Tangkulan. (*C. F. Baker*).

Type, male, Mindanao, Agusan Province, Santiago, April, 1931.

This species resembles *D. multinervosa* Fraser in that the first five antenodals show correspondence between the first and second series in the forewings of the male and both wings of the female, but is widely different from it in the number of nodal crossveins. It differs from *D. argyoides* Sélys in the lack of accessory crossveins in the cubitoanal space, and from *D. podolestoides* Laidlaw in the shape of the superior anal appendages of the male. There are other minor differences.

CŒNAGRIONIDÆ

This family includes the smallest of Odonata. All our material consists of slender clear-winged species, distinguishable at a glance from all other Philippine Odonata by having but two antenodal crossveins in each wing.

The nymphs are correspondingly slender, with three thin and leaflike gills at the end of the abdomen (inflated, so far as is known, only in *Drepanosticta*). The median lobe of the labium is generally entire, never with a widely open median cleft, and both lateral and mental raptorial setæ are generally present.

Key to the genera of the Philippine Cœnagrionidæ.

ADULTS

1. Middle fork (Mf) nearer to arculus than to nodus; stigma bordered behind by more than two cells. ..... LESTINÆ, only *Lestes*.
   Middle fork nearer to nodus than to arculus. ..... 2. CŒNAGRIONINÆ.
2. Vein Cu_2 rudimentary or wanting. ..... 3.
   Vein Cu_2 well developed ..... 5.
3. Subquadrangle divided by a vein that cuts off a small diamond-shaped basal portion ..... *Drepanosticta*.
   Subquadrangle open, undivided. ..... 4.
4. Anal crossing (Ac) resting on hind wing margin. ..... *Protosticta*.
   Anal crossing separated from hind margin by an intervening cell. *Coeliccia*.
5. With supplementary or intercalated sectors between some of principal longitudinal veins ..... *Rhinagrion*.
   With no such sectors (other than M_3a) ..... 6.
6. Tibial spines very long, twice as long as intervals between them. ..... 7.
   Tibial spines short, rarely longer than their intervals. ..... 8.

Verification Table.

Genus.	Crossveins.		Stigma.	Middle fork.	Crosslines between subnodal crossline and crossline decending from base of vein Ms.		Anal crossing	Front of quadrangle.[b]	Hind wing.
	Nodal.	Apical.[a]			Fore-wing.	Hind wing.			
									mm.
Agriocnemis	2: 5–2:7	1	Longest in front	Before subnodus	2	1	Beyond end of wing stalk	0.5	11–12
Argiocnemis	2:10	1	do	do	4		do	0.7	17–20
Amphicnemis	2:12–2:14	2	Longest in rear	Beyond subnodus	7		Before end of wing stalk	0.7	20–21
Caconeura	2:16–2:18	5–7	Regular	Before subnodus	5		Beyond end of wing stalk	1.0	22
Ceriagrion	2: 9–2:12	3–4	do	do	5	4	At end of wing stalk	0.3	22
Celiccia	2:14–2:15	3	Longest in rear	Beyond subnodus	7	5	do	1.0	26
Cœnagrion	2: 7–2: 9	2–3	Varying	Before subnodus	3	2	Beyond end of wing stalk	0.3	16–17
Drepanosticta	2:13–2:15	6–8	Regular	do	5	4	Before end of wing stalk	1.0	30
Ischnura	2: 7–2: 9	2–4	Longest in front	do	3	2	Beyond end of wing stalk	0.3	13–17
Moroagrion	2:12–2:13	5	Longest in rear	do	4	3	do	0.4	23
Pericnemis	2:12–2:15	3–4	do	Varying	5–7		Before end of wing stalk	0.4	28–37
Prionocnemis	2:15–2:23	3–5	Regular	do	4–6		Varying	0.9	23–29
Protosticta	2:15	7–10	Longest in rear	Beyond subnodus	6	5	Before end of wing stalk	1.0	21
Pseudagrion	2: 8–2:13	4–5	Longest in front	Before subnodus	4–6		Varying	0.4	17–24
Rhinagrion	2:10–2:12	2–3	Regular	do	3	3	do	0.7	25–26
Teinobasis	2:11–2:14	2–3	Varying	Beyond subnodus	7	5	Before end of wing stalk	0.3–0.4	21–25

[a] Space beyond stigma.

[b] In tenths of length of hind side.

7. Base of vein Rs one or two cells beyond subnodus..... *Cœliccia.*
   Base of vein Rs four or five cells beyond subnodus..... *Prionocnemis.*
8. Arculus out beyond second antenodal crossvein..... 9.
   Arculus opposite second antenodal crossvein..... 11.
9. Middle fork before subnodus ..... 10.
   Middle fork beyond subnodus ..... *Teinobasis.*
10. Postnodal crossveins 10 to 12 ..... *Argiocnemis.*
    Postnodal crossveins 6 to 8..... *Agriocnemis.*
11. Middle fork before subnodus ..... 12.
    Middle fork beyond subnodus ..... 17.
12. Wing stalked not as far out as anal crossing..... 13.
    Wing stalked to or beyond anal crossing..... 16.
13. Stigma covering more than a single cell..... *Moroagrion.*
    Stigma covering not more than a single cell..... 14.
14. With 6 or 7 crosslines between subnodal and 1 crossline descending from base of vein M_2 ..... *Pseudagrion.*
    With three or four such crosslines so situated..... 15.
15. Female with no midventral apical spine on abdominal segment 8; male with no middorsal bifid apical elevation on abdominal segment 10. *Cœnagrion.*
    Each sex with these characters ..... *Ischnura.*
16. Head and thorax with a pattern of bright colors..... *Pseudagrion.*
    Head and thorax concolorous, without pattern..... *Ceriagrion.*
17. Wings stalked to anal crossing..... *Pericnemis.*
    Wings stalked much beyond anal crossing..... 18.
18. Subanal plates of male normal, rounded..... *Amphicnemis.*
    Subanal plates of male long, pointed, appendagelike..... *Teinobasis.*

NYMPHS[1]

1. With raptorial setæ on movable hook of lateral lobe of labium.... *Lestes.*
   With no setæ on this hook..... 2.
2. Median lobe of labium cleft at apex..... 3.
   Median lobe of labium entire at apex..... 4.
3. Cleft open; no raptorial setæ..... *Drepanosticta.*
   Cleft closed; labium with one lateral seta on each side..... *Rhinagrion.*
4. With but 1 mental seta on each side..... 5.
   With 3 or 4 mental setæ on each side..... 6.
5. Gills parallel-sided; with a joint across middle..... *Pseudagrion.*
   Gills obovate; no joint across middle..... *Ceriagrion.*
6. Lateral setæ 4 or 5..... *Agriocnemis.*
   Lateral setæ 6 or 7..... 7.
7. Gill tips merely acute; mental setæ 4 or 5..... *Cœnagrion.*
   Gill tips acuminate; mental setæ 6 or 7..... *Ischnura.*

[1] This key is to be used with due regard to the fact that nymphs of many native species and even genera are still unknown, and that the characters stated for the four genera last named in the key are drawn from species not found in the Philippines.

Genus LESTES Leach

Of the two species of this genus recorded from the Philippines, *L. præmorsa* Sélys and *L. concinna* Sélys, only the latter is represented in the material before us. Both are dully colored yellowish species that develop distinctive color patterns at maturity and become blackish with age. In general they will be readily distinguished by the following key.

Key to the species of Lestes.

1. Front of synthorax each side with a blackish stripe that is trilobed on its outer margin; sides behind humeral suture with a number of fuscous dots; dorsum of abdomen becoming uniformly darkened. *præmorsa.*

   Front of synthorax with a single wide median parallel-sided blackish band (often lacking; never with paired stripes farther out); sides wholly pale; abdomen with a middorsal blackish stripe on segments 8 to 10 ..... *concinna.*

Nymphs of the genus *Lestes* are very elongate and slender. They are easily recognized by the form of the labium, which is excessively long, narrow, with converging sides in its basal half, and then suddenly expanded to its spoon-shaped end. The lateral lobe is so remarkably formed as to be quite distinctive of the genus (Plate 15, fig. 217). It terminates in a very deeply demarcated end hook above which are two spines with a serrated terminal border between them; also the movable hook is armed with 2 or 3 strong raptorial setæ. The gills are long and thin, pedunculate at base and obscurely segmented along axis beyond base. The best account of specific characters within the genus is that by Ris for European species.[8] No Philippine nymphs of this genus have come to us.

LESTES PRÆMORSA Sélys.

SÉLYS, Bull. Acad. Belg. (2) 13 (1862) 36, Manila; LAIDLAW, Ind. Mus. Rec. 16 (1919) 154, fig.; RIS, Zool. Mededeelingen 10 (1927) 11; NEEDHAM, Man. Dragonflies of China (1930) 235, pl. 16, fig. 6.

LESTES CONCINNA Sélys. Plate 15, figs. 214 and 218.

SÉLYS, Bull. Acad. Belg. (2) 13 (1862) 27, Manila; An. Soc. Esp. Hist. Nat. 11 (1882) 21; ibid. 20 (1891), Dolores.

A number of specimens of both sexes and of all degrees of maturity permits us to amplify the brief characterization of de Sélys that, for Philippine material, was based on a single teneral

[8] Festschr. f. Zschokke No. 22 (1922).

specimen. Our tenerals agree quite well with that description, except that the very variable middorsal brown line on abdominal segment 8 is rarely (and then only indistinctly) 3-lobed. The stripe of which it forms a part extending the length of segments 8, 9, and 10 is constantly present, as is also in the male a black line on the lateral margin of segment 9. The fuscous thoracic stripe that covers the middorsal carina is very variable, as is the brown line on the femora. There are, however, minute points of coloration on the two basal abdominal segments that appear to be very constant: a blackish dot on the side of segments 1 and 2, visible from the side, and a streak (two dots conjoined) in the pleural sutures of segment 1, visible only from below. There is an obscure transverse subapical mark of brown across the dorsum of segments 1 to 7, visible in most specimens. All these markings become overspread with a general infuscation in old specimens. It is only in these that the yellowish stigma becomes distinctly fuscous with pale terminal area. The dorsum may become black, but apparently never metallic.

Genera PLATYSTICTA Sélys, PROTOSTICTA Sélys, and DREPANOSTICTA Laidlaw

The material supplied us has been inadequate for determining the generic standing of some of the Philippine species that have been described under these generic names. Brauer described two species and Sélys one under the older and more inclusive name *Platysticta*, one of which, *P. halterata* Brauer, undoubtedly belongs in *Drepanosticta*, and one other, *P. annulata* Sélys, probably does not. Cowley has more recently added three new species to *Drepanosticta*. Cowley says[9] they all "should be transferred to *Drepanosticta*," but he also says "these three species are not known to me." De Sélys says at the end of his original description of *P. annulata*, "Le rudiment du sector inférieur du triangle manquant tout á fait, comme chez la *Protosticta simplicinervis*."

Only one of these six species is represented in the collections before us, *Drepanosticta lymetta* Cowley. We therefore will undertake nothing further than a fuller characterization of that species, still insufficiently known; the description of a new species from a female specimen; and a listing of the others with bibliographic references.

[9] Trans. Ent. Soc. Lond. 85 (1936) 166.

Leaving Sélys's *P. annulata* and our *D. septima* out of account and assuming that all the others belong in *Drepanosticta*, the males may be separated by the following key.

A key to the species of Drepanosticta.

MALES

1. No erect processes arising from hind lobe of prothorax..... *lestoides*.
   Horns or prominences of some sort present..... 2.
2. These processes upcurving triangular points..... *myletta*.
   These processes longer and more or less dilated apically..... 3.
3. These processes short, flat, each about as wide as interval between them. *megametta*.
   These processes much slenderer ..... 4.
4. These processes obliquely truncate at converging tips..... *lymetta*.
   These processes very long, sinuous, knobbed at end..... *halterata*.

DREPANOSTICTA LYMETTA Cowley. Plate 15, figs. 197, 198, 200, 202, and 205; Plate 22, fig. 310.

Cowley, Trans. Ent. Soc. Lond. 85 (1936) 661, figs., Surigao Province, Mindanao.

Abdomen, 27 mm; hind wing, 20.

Our material from the type locality agrees fairly well with Cowley's description of the type material (two incomplete males, lacking the end segments of the abdomen) and with his figure of the appendages of the thoracic dorsum. These characters are adequate for recognition.

A slender, plain, brownish, yellow-legged species, with abdomen ringed with yellow. In the alcoholic specimen before us the dorsum of the head is blackish, with the ocelli paler. Labrum and antennæ yellow. Legs yellow, including spines and claws, an obscure submedian band of brown on all femora. Thorax smoothly polished, pale brown except between leg bases beneath and at junction with abdomen. Wings hyaline, with brown veins and yellowish stigma. Abdomen lighter brown, with rather wide pale rings on base of segments 3 to 7.

The sexes are practically alike except for the hind lobe of the prothorax as shown for both sexes in Plate 15, figs. 198 and 202, and also the terminal abdominal segment.

In the male, segment 10 is half as long as segment 9, one-third as long as segment 8, and a little less than half as long as the appendages. These segments brown, only a little paler beneath and on appendages, and with hair lines of black on transverse apical carinæ. Appendages as shown in Plate 15, figs. 197 and 200.

A single female came with one of the males from Surigao Province (in the same envelope, whereas all the other males were separately papered) and is presumably but not indubitably of the same species. It is paler, with a plain ovipositor, and the dorsum of segments 7 to 10 is wholly pale. The sheath of the ovipositor is smooth, angulate on both angles at its tip, and bears a slender palp that is wholly pale (Plate 15, fig. 205).

DREPANOSTICA HALTERATA Brauer.

BRAUER, Verh. Zool. Bot. Ges. Wien. 18 (1868) 551, Luzon; SÉLYS, An. Soc. Esp. Hist. Nat. 11 (1882) 30, Mindanao, May; Mem. Cour. 38 (1886) 153.

Male, abdomen, 36 mm; hind wing, 25.

Female, abdomen, 29 mm; hind wing, 21.

DREPANOSTICTA LESTOIDES Brauer.

BRAUER, Verh. Zool. Bot. Ges. Wien. 18 (1868) 552, Mindanao; SÉLYS, An. Soc. Esp. Hist. Nat. 11 (1881) 30, Mindanao, December 10 to 12; Mem. Cour. 38 (1886) 154.

Male, abdomen, 43 mm; hind wing, 25.

DREPANOSTICTA MYLETTA Cowley.

COWLEY, Trans. Ent. Soc. Lond. 85 (1936) 160, Borongan, Samar.

Male, abdomen, 29 mm; hind wing, 19.

DREPANOSTICTA MEGAMETTA Cowley.

COWLEY, Trans. Ent. Soc. Lond. 85 (1936) 163, Mindanao, Surigao Province.

Male, abdomen, 29 mm; hind wing, 18.

Female, abdomen, 29 mm; hind wing, 21.

PROTOSTICTA ANNULATA Sélys.

SÉLYS, Mem. Cour. 38 (1886) 156 (in *Platysticta*), Luzon.

Female, abdomen, 29 mm; hind wing, 21.

DREPANOSTICTA SEPTIMA sp. nov. Plate 15, figs. 201 and 204.

Abdomen, 31 mm; hind wing, 21.5.

Postnodal crossveins 15 and 13 in forewing and hind wing, respectively.

Female.—The color pattern of this single, rather immature specimen is remarkably similar to that of *D. lymetta*, except that there is a middorsal black stripe on abdominal segments 8 to 10, narrowly divided lengthwise by paler. The form of the hind lobe of the prothorax as viewed from the front is distinctly 3-lobed and much wider, being almost the width of

the body of that segment. The caudal appendages are much longer. The sheath of the ovipositor is very different, being strongly serrate on its lower border and rounded at both apical angles where that one is angulate. The palp at the end is stout and black-tipped.

The single female specimen with abdominal segment 6 broken in two in the middle and flattened, was collected in the island of Samar by R. C. McGregor, April 29, 1924.

DREPANOSTICTA sp. Nymph.

The nymph of *Drepanosticta* is known for one species that Lieftinck has described from Java, *D. sundana.*[10] Plate 15 shows his figures of the nymph. It is most remarkable for the entire lack of raptorial setæ on its gomphinelike labium.

CACONEURA INTEGRA Sélys. Plate 17, figs. 244 and 245; Plate 20, fig. 294.

SÉLYS, Mem. Cour. 38 (1886) 172 (in *Disparoneura*); An. Soc. Esp. Hist. Nat. 11 (1882) 30, Basilan, Mindanao.

Male, abdomen, 31 to 34 mm; hind wing, 20 to 22.

We have a single male specimen from Kabasalan, Zamboanga Province, Mindanao, taken in July, 1932, by H. C. Muzzall. It is slightly larger than the single specimen of de Sélys, but agrees well with his description of coloration. A blackish species with a bluish stripe across head from eye to eye through ocelli, with sides of synthorax broadly and regularly striped with black and blue. Postnodal crossveins about seventeen and fifteen in forewing and hind wing, respectively. But one line of crossveins between quadrangle and subnodal line; the lines farther out are at 5—5—5-line intervals between ultranodal sectors. Abdomen black, with small blue areas at both ends on several segments. Male appendages (Plate 17, figs. 244 and 245) distinctive.

CACONEURA OBSOLETA Sélys.

SÉLYS, Mem. Cour. 38 (1868) 173 (in *Disparoneura*); An. Soc. Esp. Hist. Nat. 11 (1882) 31 ("Quelle des Banko").

This species we have not seen. It is known only from a single discolored teneral specimen. Hardly anything in the de Sélys description seems to distinguish it from the preceding species except the greater length of the abdomen, and that might be due to the flaccid condition of a teneral specimen, allowing the telescoped joinings of the segments to be extended. More and better material is needed to determine the status of this species.

[10] Treubia 14 (1934) 463–8.

RHINAGRION PHILIPPINUM Sélys. **Plate 15, figs. 206 to 213, 215, and 216; Plate 20, fig. 291.**

SÉLYS, An. Soc. Esp. Hist. Nat. 11 (1882) 21, Bohol; Mem. Cour. 68 (1882) 94.

Male, abdomen 35 mm; appendage, 1.5; hind wing, 25.

Female, appendage, 35 mm; hind wing, 27.

Female hitherto unknown.

Female.—Head patterned with black and olivaceous cream. Labrum black; base of mandibles pale; postclypeus black; anteclypeus black, longitudinally divided in center by a pale band; antennæ black, with a pale ring around distal end on segment 1; eyes surrounded by a broad band of pale but with a long narrow cuneiform black spot against them on their occipital borders. An irregular T-shaped black spot over frons, vertex, and occiput. (Plate 16, fig. 206.)

Prothorax pale olive-cream on posterior lobe, on sides and on venter; on anterodorsal portion a hastate spot of black lying in an area of rich golden brown. Synthorax light golden brown on sides and dorsum, marked with greenish as follows: A pair of large oval spots on dorsum, an oblong spot lying vertically on top of mesepisternum and metepimeron, another spot on bottom of same sclerites and on metepisternum; dorsal half of metepisternum greenish. Venter of synthorax pale greenish. Wings hyaline, with black veins and dark-brown stigma. Femora pale, darkened at joints with tibiæ. Tibiæ somewhat darker, especially at ends. Tarsi black. Femora, tibiæ, and tarsi armed with two rows of long strong spines, outer row on fore tibiæ very closely set on distal half.

Segment 1 of abdomen greenish, segments 2 to 10 reddish brown marked with paler and black. Apical carinæ black, preceded by a pair of dorsal light spots, larger on segments 2, 7, 8, 9, and 10. On segments 8 and 9 these spots extend almost the length of the segment. In more teneral specimens there is a lateral dark longitudinal stripe on segments 3 to 10. Tip of appendages black.

Male.—Pattern on head, as far as can be seen in so teneral a specimen, generally same as in female. Wings as in Plate 20, fig. 291.

This species has been known hitherto from a single teneral male specimen, from which the last four segments of the abdomen were lacking. We are glad to be able to present a more complete description and figures of both sexes, and also of the nymph. Among the cœnagrionines the adult will be readily

recognized by the unbraced stigma covering two cells and by the presence of intercalated sectors between the principal veins of the wing: also, in the female, by the huge ovipositor with its very long palp.

LUZON, Laguna Province, Los Baños, 5 females, (*L. P. Zialcita, R. Gines, Ernesto Padilla, M. Allas,* and *C. Pañgramuyen*); 1 male and 1 female, collector unknown. Bangayas Bay, 1 female (*E. Carandang*).

RHINAGRION PHILIPPINUM Sélys. **Nymph.**

Length, 15 mm; gills, 4 additional; abdomen, 8.

Width, head, 5 mm; abdomen, 4.

A rather stout, smooth, brownish nymph with depressed head with sagging hind angles behind the rounded eyes, and with short, broad, heavily pigmented gills. Head flattened above, widest across the large eyes, then parallel-sided to the rounded and scurfy-spinulose hind angles, between these angles a widely excavate occipital border. Antennæ about as long as head, pale beyond the two basal segments. Relative length of the seven segments 5 : 10 : 12 : 13 : 10 : 7 : 5. At side margin of squarish head and beneath eye a longitudinal carina armed with about a half dozen sharp teeth that are visible from above. Just behind these teeth a series of more minute teeth that crown the outer hump on the mandible. Labium short, broad, and flat, its length to tip of median lobe hardly greater than its breadth, its basal width half its apical, its sides almost straight-margined. Median lobe prominent, with a closed middle cleft, its border retrorsely and irregularly denticulate. Mental setæ lacking. Lateral lobes narrow, each armed with a single raptorial seta beside base of which is a minute spinule. End hook very short; next to it on terminal border a stout hook almost as long as movable hook, between these two hooks another bladelike hook half as long, with both edges microscopically serrulate. Mandible armed with a terminal vertical row of stout arcuate teeth that diminish in size downward; on inner, concave side, two or three short clawlike unequal smaller teeth. Low, rounded outer bump of mandible covered with pedicellate spinules, serrately arranged, with tips pointing forward.

Disc of prothorax shield-shaped, rounded behind, with projecting truncate articulation prominence in front. Beneath low flaring front angles of prothorax two longitudinal carinæ, both carinæ armed with denticles that point forward, lower

carina on coxa. Wings on this nymph (probably penultimate instar nymph) reach backward to middle of abdominal segment 6. Legs brownish on femora and tibiæ, twice banded with paler. Outer carinæ of femora minutely serrulate. Tarsi pale.

Abdomen stout, little depressed, regularly tapering to rearward, with a pale middorsal longitudinal line bordered by a single pair of sooty spots on each segment. Gills short, broad, oblong, very black except at extreme apex; laterals with midlateral carinæ for half their length, carinæ spinulose-serrate externally. Lateral margins of last two abdominal segments similarly margined.

The developing venation in the wings shows the intercalated sectors that characterized only this known species in the fauna.

LUZON, Laguna Province, Mount Maquiling, altitude 200 feet, April 9, 1932, five nymphs, only one well grown and with gills preserved.

A nymph, apparently of this genus, was described and figured by the senior author in 1911 as belonging to the Sélysian "Legion Podagrion."[11] At that time it was not more closely determinable. The specimen was loaned to me for study by the Museum of Comparative Zoölogy, Cambridge, Massachusetts. It bore the museum number *334*, and was labelled as coming from India, without more specific locality designation. A comparison of the figures above cited with those of *R. philippinum* presented shows close agreement herewith. A further comparison of the venational characters cited in the above-mentioned paper with those shown by Fraser for adult *R. mima* from Burma[12] shows only very minor differences. The most notable recorded difference is in the much smaller number of apical costal crossveins beyond the stigma in *R. mima:* about four in *mima*, about ten in the unknown nymph. The latter may well represent a species that is still unknown in the adult stage.

CŒLICCIA DINOCERAS Laidlaw. Plate 17, figs. 249 to 251.

LAIDLAW, Philip. Journ. Sci. 28 (1925) 562, male, figs., Kolambugan, Lanao Province, Mindanao; Rec. Ind. Mus. 34 (1932) 33.

Male, abdomen 36 mm; hind wing, 25.

We have a single male from Mount Cantugas, Surigao Province, Mindanao, that agrees well with Laidlaw's description, but not quite so well with his figure of the prothoracic horns which

[11] Entom. News 22 (1911) 342, 343, pl. 11, figs. 1–4.
[12] Faun. Brit. Ind. 1 (1933) 92, fig. 41.

may be variable; so we show a figure of them as they appear from the front in our specimen. In a side view (such as Laidlaw's fig. 3) they show the terminal lobings of the upper side that suggest budding branches. These horns instantly distinguish it from the following species. Postnodal crossveins sixteen and fifteen in forewings and hind wings, respectively. Middle fork, Mf, at subnodus, with Rs arising well beyond it. Dorsum of the thorax with a pale stripe on each side, arising from front and tapering upward to a point, with an isolated more lateral spot near the crest.

CŒLICCIA BRACHYSTICTA Ris.

Ris, Suppl. Ent. 1 (1912) 63, male and female, Naujan, Mindoro.

Male, abdomen, 44 mm; hind wing, 30.

Female, abdomen, 41 mm; hind wing, 30.

This species we have not seen. It differs most strikingly from the preceding in lacking the great horns of the hind lobe of the prothorax, the prothorax being broadly and evenly rounded. Postnodal crossveins nineteen and seventeen in forewing and hind wing, respectively. Middle fork, Mf, just before subnodus, Rs arising beyond it. Dorsum of thorax wholly black.

This species was overlooked by Laidlaw in 1925, but was listed in his monograph of *Cœliccia* in 1932.

Genus PRIONOCNEMIS Sélys

This genus is peculiar to the Philippines and is one of the most interesting in the fauna. Five of the known species were described by Brauer in 1868 and three by de Sélys later. Only one of these, *P. hæmatopus,* has been adequately illustrated, and the nymph has not hitherto been described for any of them. We have had before us seven of the eight species and nymphs of one. For one species, *P. serrata,* we have had abundant material in all degrees of maturity, from callow tenerals to obfuscated seniles, and it has been very instructive as to the vast color changes that some species of the genus undergo.

The genus is readily recognized by easily observable characters of wing venation. The middle fork, Mf, is far out in the wing, at or even a little beyond subnodus. Veins Rs arising from four to eight cells farther out, unusually close to base of vein M_2. Apical margin of wing more or less sinuate, by reason of emargination between vein tips. Correlated with the extent of this crenulation of the wing margin is the position of the arculus in relation to the second antenodal crossvein. When

the crenulations are rather deep and extensive, as in *serrata*, *erythrura*, and *appendiculata*, the arculus is situated well beyond that crossvein; when shallow and few, as in *atropurpurea* and *hæmatopus*, the arculus is opposite it.

Sélys also described another species, *flammea*, from Mindanao, which we have not seen but are inclined to regard merely as a form of *ignea* and have omitted from the key below.

De Sélys (1882) offered a tentative key to the species, based mainly on color characters, which serve fairly well with fully colored male specimens. We give below a modification of that key, like his (except in the first rubric), applicable only to fully colored males. The color pattern of females and all tenerals is given in Plate 14, figs. 171 and 172.

Key to the species of Prionocnemis.

ADULT MALES

1. Body black, spotted and streaked with blue ..... 2.
   Body black or red or both without blue spots ..... 3.
2. Middle lobe of prothoracic dorsum with a pair of low rounded tubercles ..... *serrata.*
   Middle lobe with a pair of erect yellow horns (female) ..... *cornuta.*
3. Postclypeus metallic blue, body shiny black, tinged with purplish; legs chalky white internally ..... *atropurpurea.*
   No metallic blue on face and no white on legs ..... 4.
4. Body black and red ..... 5.
   Body wholly red ..... 6.
5. Legs black ..... *erythrura.*
   Legs scarlet ..... *hæmatopus.*
6. Postclypeus blackish ..... 7.
   Postclypeus reddish ..... *ignea.*
7. Legs wholly reddish ..... *rubripes.*
   Legs brownish, with blackish marks on knees and at base of claws. *appendiculata.*

PRIONOCNEMIS SERRATA Sélys. Plate 14, figs. 171 to 173, 184 to 186, and 191 to 195.

Sélys, Bull. Acad. Belg. (2) 16 (1863) 154, Manila; An. Soc. Esp. Hist. Nat. 11 (1882) 24, Mindanao; ibid. 20 (1891) 216, Dolores.

A hyaline-winged jet-black species very prettily marked with deep blue, and with outer ends of wing margins conspicuously serrate; but the coloration is extremely variable. In fully colored males the lower half of the face is blue, also the entire prothoracic dorsum except for a median black line that is widened at the rear. Two broad oblique blue bands on sides of synthorax, anterior band of double width in lower half. Abdominal segments with subapical blue rings, widest and

brightest blue on segment 2. None of these markings developed on teneral specimens, all less distinct on females. Also, they are very erratic in their variability, some being developed when others are not. Rings on abdomen white, or some white and others blue. Segments 10 of abdomen and appendages wholly white or wholly black or anything intermediate, appendages when white often tinged with pale sky-blue. Pale legs darkened at knees and may become distinctly lineate with fuscous on forelegs externally.

Females always show less of the blue color. The hindmost of the two bands on the sides of the synthorax rarely appears at all; the black of the thorax is purplish, the sides of the abdomen are a purplish brown, sometimes with a reddish cast, and the subapical rings on the abdominal segments are white.

Teneral specimens of both sexes are wholly pale, with darker joints to all the segments of both body and legs. Their wings often show a wonderfully fine iridescent color in which blue predominates. Tenerals will, however, be recognized by the form of the abdominal appendages in the male and by that of the prothoracic dorsum in the female; these are shown in Plate 14. The arculus in this species is located well beyond the second antenodal crossvein.

LUZON, Laguna Province, Mount Maquiling, Los Baños, and Ube, many specimens of both sexes; Bay, Bangyas; Batangas Province, Tanauan, Taal: Tayabas Province, Quezon Park: Cavite Province, Indang: Rizal Province, Novaliches. Practically all collectors.

PRIONOCNEMIS sp. Nymph (SERRATA supposition).

Nymph apparently in penultimate instar.

Length, 10.5 mm; gills, 3 additional; abdomen, 6.

Width, head, 3.5 mm; abdomen, 2.5.

A smooth brownish nymph with depressed head, short stout body, and wide blackish gills. Head widest across posterior third of very large and prominent eyes, narrowed at once behind them to rather small well-rounded scurfy pubescent hind angles between which it is widely and deeply excavate on the occipital border. Antennæ pale, relative length of segments variable as shown by two examples, 9 : 10 : 12 : 11 : 8 : 4 : 2 and 7 : 10 : 9 : 11 : 8 : 5 : 4. Labium broad and flat, mentum about as wide as long, an equilateral triangle with eroded angles, straight lateral margins spinulose on distal half. Median lobe very

prominent, broadly rounded at end, its margin beset with microscopic retrorse serrulations. A pair of short mental setæ starting almost in line with outermost angle and about as far from them as they are from each other. A transverse suture with a single nodule on it on each side, running across rounded tip submarginally.

Lateral lobe short, very narrow, armed with two strong raptorial setæ. Movable hook very long and strong, longer than distance to basal articulation, strongly curved, smoothly tapering. End hook unusually large, similarly curving, insensibly passing basad into retrorsely serrulate inner margin of body of lobe. On inner side of end hook a shorter bladelike piece that is minutely serrate on outer upper side and around end, but smooth on margin next to end hook.

Beside the labium and behind the basal articulation of the mandible there is a toothed carina similar to that in *Rhinagrion*.

Prothorax depressed and smooth above. Legs concolorous, like the body. Their anterior carinæ bearing minute spines, the posterior ones, sparse soft hairs. Wing cases reaching backward almost to abdominal segment 6.

Abdomen smooth, a little depressed at base, becoming cylindric at rear end, where lateral margins of terminal segments are finely serrate. Gills short, broad, dark colored, divided by a very oblique groove into a large firm brown basal portion of two thirds their entire area, and a thinner apical portion that is abruptly rounded to a blunt apex. This outer portion heavily suffused with a dark pigment except for a narrow and very hyaline terminal border. The strong lateral carinæ of basal portion heavily spinulose-serrate.

The generic determination of this nymph is positive because of the fairly well preserved venation in the wings of our specimen. The species is probably *P. serrata*, for the arculus is distinctly beyond the second antenodal crossvein, the postnodals are twenty, and the lines of crossveins farther out are well within the range of that species. The crenulations of the wing margin are not apparent, but probably do not appear at that stage of development.

This nymph is superficially similar to that of *Rhinagrion*. It is adapted to the same kind of habitat as shown by its stout smooth depressed head, and narrow lateral labial lobes. It bears a sign of real affinity in the serrated blade that stands between the movable hook and end hook at the tip of the lateral lobe, but there *Rhinagrion* has a second hook beside it.

The specimens came in two vials (in one intermixed with nymphs of *Rhinagrion*), both from Molawin Creek; one labeled "Los Baños, February, 1930, Entom. I Students" sent by Doctor Uichanco, and the other "Mount Maquiling 9 XI 1932 200' alt."

PRIONOCNEMIS CORNUTA Brauer.

BRAUER, Verh. zool.-bot. Ges. Wien 18 (1868) 548, female, Luzon and Mindanao; SÉLYS, An. Soc. Esp. Hist. Nat. 11 (1882) 24; ibid. 20 (1891) 216, male, Dolores.

This species we have not seen. As indicated above, Brauer had only the female, and when de Sélys later obtained specimens from Dolores he apparently had only the teneral male. He concluded his description of it with the remark that the diagnostic character for the species still remains in the form of the middle lobe of the prothorax. We have therefore used this character in our key.

PRIONOCNEMIS ATROPURPUREA Brauer. Plate 14, figs. 180, 187, 188, and 196.

BRAUER, Verh. zool.-bot. Ges. Wien 18 (1868) 549, Manila; SÉLYS, An. Soc. Esp. Hist. Nat. 11 (1882) 24 (May to July).

An elegant purplish-black species with conspicuously white femora and with only a suggestion of serrulation at the wing tips. The labrum and postclypeus are bare, shiny metallic green. The former has a thin marginal fringe of stiff brown hairs. Anteclypeus and corners of mouth white. Top of head velvety black. Entire body shiny plumbeous black with thin membranes at wing bases and at other sutures white. The male terminal appendages vary from black to white, usually being black above and white on the under side.

Female.—The female is hitherto undescribed.

Abdomen, 37 mm; hind wing, 25.

The female is so different in aspect from the male that we would have hesitated to put the two together but for McGregor's thoughtfulness in placing a pair in an envelope and marking it to indicate that they were taken in copulation. The two have but one color character in common and that is the shiny green metallic postclypeus.

Almost concolorous yellowish brown throughout, possibly reddish in life, paler beneath, with only a shiny green metallic postclypeus for distinction. Legs a little darker at joints of segments and on tarsi. Wing membrane a little tinged with brownish distally. Abdomen diffusely darkened on dorsum of middle segments and again on sides of segments 8 and 9. The

diagnostic character is again found in the conformation of the prothoracic dorsum, shown in Plate 14, fig. 180.

LUZON, Laguna Province, Los Baños, April 23, 1931, 2 males (*F. Juan*), April 25, 1931, 1 male (*McGregor and Celestino*); Ube, March 2, 1 male (*McGregor*), April 25, 1 female (*McGregor*), April 19, 1 male and 1 female (*McGregor*).

PRIONOCNEMIS ERYTHRURA Brauer. Plate 14, figs. 178 and 179.

BRAUER, Verh. zool.-bot. Ges. Wien 18 (1868) 550, Philippines; SÉLYS, An. Soc. Esp. Hist. Nat. 11 (1882) 24 (May 24 and 25).

Abdomen, 35 to 40 mm; hind wing, 24 to 26. The smaller of these measurements are from our single specimen, a mature male.

A sooty blackish species, with blackish legs, and slender abdomen that is moderately enlarged to rearward on segments 7 to 10, and reddish on these segments. Wings slightly tinged with brown, strongly crenulate around outer end. The form of the male appendages is shown in Plate 14, figs. 178 and 179.

Female unknown.

We have seen but a single male specimen, taken at Quezon Park, Tayabas Province, May 13, 1931 (*F. Juan*).

PRIONOCNEMIS HÆMATOPUS Sélys. Plate 14, figs. 177, 189, and 190.

SÉLYS, An. Soc. Esp. Hist. Nat. 11 (1882) 25, 1 pl., Mindanao.

Male, abdomen, 39 to 41 mm; hind wing, 23 to 25.

Female, abdomen, 33 to 37 mm; hind wing, 25 to 26.

This species was illustrated by de Sélys in an excellent color plate. It is a large and very striking species by reason of its black mantle covering head and front of thorax, its orange sides, and its scarlet legs and feet. The female is mainly orange and paler, and also has scarlet legs.

Our specimen agrees closely with the type.

LUZON, Tayabas Province, Quezon Park, 3 males, collector unknown, 1 male and 1 female, May 10, 1931 (*F. Juan*), 1 female, May 29, 1931 (*F. Juan*): Laguna Province, 1 male, December 26, 1930, collector unknown; Los Baños, 2 males, March 25, 1930 (*G. I. Perez*), 1 male, January 30, 1931 (*L. Boongaling*), 1 male, April 21, 1931 (*F. Juan*), 1 male, December 20, 1931 (*L. Boongaling*), 1 male, February 10, 1932 (*J. Amores*); College campus, 1 male and 1 female, February, 1931 (*M. E. Rosell*), 1 female, February 10, 1932 (*J. Reyes*); Mount Maquiling, 1 male and 1 female, January 28, 1930 (*A. C. Duyag*), 1 female, January 27 to 31, 1930 (*A. C. Duyag*): Cavite Province, 1 male, December, 1930 (*M. E. Rosell*).

PRIONOCNEMIS IGNEA Brauer. Plate 14, fig. 174.

BRAUER, Verh. zool.-bot. Ges. Wien 18 (1868) 547, Luzon; SÉLYS, An. Soc. Esp. Hist. Nat. 11 (1882) 26, Manila.

Male, abdomen, 37 to 44 mm; hind wing, 22 to 27.

Female, abdomen, 36 to 41 mm; hind wing, 25 to 28.

A single female specimen that agrees with Brauer's rather brief description of the female type is so like the female of the preceding species that it may only be positively differentiated by the form of the hindmost lobe of the prothorax and by the ovipositor sheath which projects beyond the tips of the cerci farther than the latter are long and which in *P. hæmatopus* is only about half the length of the cerci. The hindmost lobe of the prothorax is not at all curved forward as in the preceding species but slopes a little backward and is deeply divided by a sharp median cleft. As in *P. hæmatopus*, the arculus is at the second antenodal crossvein and the wing apex is very slightly crenulate.

Our specimen bears the label: "Agricultural College, Laguna."

PRIONOCNEMIS RUBRIPES sp. nov. Plate 14, figs. 175, 176, and 183.

Male, abdomen, 41 mm; hind wing, 27.

Female, abdomen, 40 mm; hind wing, 27.

Male (*type*).—Head reddish, darker on postclypeus (sometimes with bluish reflections in darkest part) and around individual ocelli.

Prothorax and synthorax dull light orange, paler beneath, with touches of black at wing bases, middorsal carina narrowly black. Wings subhyaline, with dark-brown veins, and stigma narrow, hardly expanded in middle. Postnodals 19 in forewing, 16 or 17 in hind wing. Legs entirely brilliant scarlet, long, with long spines also scarlet. Tarsal claws bifid near tip.

Abdomen of same general color as thorax, with no very definite pattern but darker dorsally on segments 3 to 6 and on anterior end of segment 7. Appendages as shown in Plate 14, figs. 175, 176.

Female (*allotype*).—Coloration practically same as in male, with the following differences: Less dark around ocelli, prothorax narrowly bordered dorsally both anteriorly and posteriorly with dark brown, legs about same color as thorax. Wings somewhat broader than in male. Stigma yellow, bordered with dark-brown veins. Postnodals 18 in both fore- and hind wings.

Ovipositor sheath broad, parallel-sided, strongly serrate below, projecting beyond tips of cerci by about length of latter.

The most striking difference between this and other species in the genus is the form of the posterior lobe of the prothorax (Plate 14, fig. 183).

MINDANAO, Surigao Province, Dinagat, 1 male and 1 female, April 1, 1931 (*A. C. Duyag*).

PRIONOCNEMIS APPENDICULATA Brauer. Plate 14, figs. 181 and 182.

BRAUER, Verh. zool.-bot. Ges. Wien 18 (1868) 548, Mindanao; SÉLYS, An. Soc. Esp. Hist. Nat. 11 (1882) 27 (early July to late August).

Male, abdomen, 31.5 mm; hind wing, 21.

Smaller species red all over except for a shiny blackish postclypeus. Thoracic dorsum and last segment of abdomen somewhat darkened; in some specimens this segment quite brownish. Wings a little tinged with amber, more frequently the hind wings. Wing tips rather strongly crenulate, arculus well beyond second antenodal.

Female unknown.

We have specimens (males only) from the following localities:

MINDANAO, Agusan Province, Santiago, April, 1931, collector unknown: Lanao Province, Kolambugan, May, 1932, collector unknown: Surigao Province, Mainit, June 31, 1931 (*A. C. Duyag*); Dinagat, June 12, 1931 (*A. C. Duyag*): Davao Province, Mati, April, 1927, collector unknown.

ARGIOCNEMIS RUBEOLA Sélys. Plate 16, figs. 219 and 220; Plate 20, fig. 295.

SÉLYS, An. Soc. Esp. Hist. Nat. 11 (1882) 29, Luzon; ibid. 20 (1891) 218, Sibul.

Following de Sélys we use this name, but with some doubt as to its validity. That question we must leave to others who have access to types and to material of a wider range. The one Philippine species that we have before us is represented by abundant material showing a wide range of color variation. We have no doubt it is the species listed by de Sélys, for there are red specimens that quite agree with his description.

The color characters mainly used in past descriptions are very variable, and figures of genitalia are almost wholly lacking. Fraser[13] lists *A. rubeola* as a synonym of *A. rubescens* Sélys and then says at the end of his description of the latter "The species is distinguished at a glance from *A. rubeola* by the total absence of black on the labrum", which statement is a bit confusing. Assuming the correctness of his figure of the male

[13] Faun. Brit. India 1 (1933) 406.

genitalia of *A. rubescens*, ours is certainly different, as Plate 16, figs. 219 and 220 will show.

Such is the aspect of maturity in many of our red specimens that we are not wholly convinced that they are merely younger specimens. We prefer to treat the blacks and reds of this bicolorous species as two color phases, at least until they have been reared through their reproductive cycle.

Black and blue phase.—Adult male predominantly black with bright blue stripings on synthorax. Top of head black, with large oval blue postocular spots close to eyes. These spots a little longer than wide and lying with their long axes lengthwise to body. Face blue, paler near eyes, with more or less black upon postclypeus and on lateral margins of labrum. Antennæ black.

Prothorax black above, with blue anterior lobe, light touches of blue at sides of posterior lobe, a blue streak running down on front to fore femur. Synthorax black in front, with an antehumeral stripe of blue, continuous from crest to collar. Sides blue with a black stripe that extends from hind wing base to trochanter of hind leg, curving downward at its lower end.

Legs black on femora externally, on tibiæ internally, and on tips of tarsi, with black spines and claws. Femora a pretty blue at base. Wings subhyaline, with brown veins and stigma. Postnodal crossveins ten or eleven and nine or ten in forewing and hind wing, respectively. Wings not stalked as far out as anal crossing.

Abdomen black above on segments 1 to 7 and on segment 10; segments 8 and 9 blue. Sides of segments 1 and 2 blue with diminishing lateral streaks of same color on segments 3, 4, and 5; segment 10 pale only underneath. Superior appendages stout, fuscous, forcipate, obliquely truncate at end and with a very large inferior basal tooth. Inferiors paler, bidentate at end, outer tooth longer.

Red phase.—Male (apparently fully adult). Similar but wholly lacking blue color, except on postocular spots, and almost lacking black on abdomen. Abdomen reddish, brightest on dorsum of middle segments. Sides of thorax and legs pale, leg spines and tips of tarsi black. Abdominal segments 8 and 9 pale, segment 10 wholly brownish.

The male appendages are identical in both phases, and the females are similar to their corresponding males, but less brightly colored.

LUZON, Laguna Province, Pila, Los Baños; Ube; Bay, Bangyas: Manila: Nueva Vizcaya Province: Bulacan Province, Ipo: Rizal Province, Novaliches; Makabud, San Francisco del Monte: Tayabas Province, Lucban. MINDANAO, Zamboanga Province, Kabasalan. Many specimens.

AGRIOCNEMIS FEMINA Brauer. Plate 18, figs. 265 and 266; Plate 21, fig. 302.

BRAUER, Verh. zool.-bot. Ges. Wien 18 (1868) 554 (in *Agrion*), Luzon; SÉLYS, Bull. Acad. Belg. (2) 43 (1877) 149 (as *A. cricisa*); An. Soc. Esp. Hist. Nat. 11 (1882) 29 (as *A. cricisa*), Basilan; NEEDHAM, Zool. Sinica Ser. A 11 (1930) 254 (pl. 9, fig. 3, male, appendage), Formosa; FRASER, Faun. Brit. Ind. Odon. 1 (1933) 402 (figs., male appendages).

Abdomen, 16 to 17 mm; hind wing, 11.

This diminutive damselfly, one of the smallest in the order Odonata, is both widespread and abundant in the Philippines. It exhibits an extraordinary variety of coloration, varying with age, sex, and phase, but it is generally blackish above, greenish or reddish on its sides, and yellowish beneath. Old males become very pruinose on the face, thorax, and femora, taking on the appearance of having been heavily dusted with flour. Males will be readily distinguished from the following species by having the stigma of the same color in forewing and hind wing, and by the form of the caudal appendages.

AGRIOCNEMIS VELARIS Sélys. Plate 18, figs. 267 and 268.

SÉLYS, Bull. Acad. Belg. (2) 43 (1877) 146 (as *A. pygmæa*), Manila; An. Soc. Esp. Hist. Nat. 11 (1882) 29.

Abdomen, 20 mm; hind wing, 11.

Of this species we have received but few specimens. None of the males are pruinose. The stigma of the forewings is much paler than that of the hind wings. The sides of the body and the small oval postocular spots on the head are bright green. The appendages of the abdomen (Plate 18, figs. 267 and 268) are strikingly different from those of the preceding species.

LUZON, Tayabas Province, Candelaria, 2 males and 1 female, April 22, 1930 (*F. Rivera*).

ARGRIOCNEMIS LUNULATA Sélys.

SÉLYS, Bull. Acad. Belg. (2) 43 (1877) 139, Malaysia, Celebes, Sulu; An. Soc. Esp. Hist. Nat. 11 (1882) 29, Luzon (as *A. rubeola*); ibid. 20 (1891), 218, Sibul.

Male, abdomen, 28 mm; hind wing, 17.

Female, abdomen, 26 mm; hind wing, 18.

Top of head black with round greenish postocular spots, postclypeus and labrum beyond its black base, bright green. Thorax

black in front, striped on sides with greenish. Abdomen black above, segments 7 to 10 reddish. Superior appendages of the male a little longer than 10, inferiors half as long. Postnodal crossveins eleven or twelve.

We have not seen this species; the present notes are abstracted from de Sélys' original description.

The nymph of another Oriental species, *A. lacteola,* was described by the senior author.[14]

Genus MOROAGRION novum

Body stout. Head broad, eyes set well forward. Antennal segment 1 very short, segment 2 long, equal in length to segment 3. Legs heavily built, with strong spines of length about equal to intervals between them. Tarsal claws with an inner denticle near tip. Wings not stalked as far as anal crossing, ac, rather broad in proportion to length; quadrangle rhomboidal, front margin less than half length of hind margin in forewing; arculus at second antenodal crossvein, anal crossing, ac, about halfway between first and second; Rs arising at subnodus, M_3 arising well proximal to it, both veins approximated at first intervening crossvein; stigma lozenge-shaped, covering one and one-half cells. Anal appendages of the male with processes of subanal plates enormously developed, appearing like a third pair of appendages.

In venation this genus differs little from *Calicnemis.* The upper side of the quadrangle is shorter and the space between it and the subnodal line of crossveins is longer, with three intervening crosslines in two of the four wings in the type specimen (in *C. atkinsoni* there is often but one crossline in this space in the hind wing). The stigma is a little longer and the base of vein M_2 a little farther out.

Greater differences occur in the abdomen, which is much stouter in *Moroagrion* and distinctly widened to the apex on the three last segments. Also segment 3 is relatively shorter in *Moroagrion;* it is more than twice the length of segment 2 in *Calicnemis.* The raised and denticulate ridge around a depressed field at the end of the dorsum of segment 10 is entirely lacking in *Calicnemis.*

MOROAGRION DANIELLI sp. nov. Plate 17, figs. 240 and 241; Plate 20, figs. 296 and 297.

Male, length, 39.5 mm; abdomen, 29; appendage, 1; hind wing, 22.

[14] Dragonflies of China (1930) 255, pl. 19, fig. 2.

A brilliant black and orange species. Head gross, covered with stiff hairs, black, with yellow and orange markings: a band across front of labrum, one band covering anteclypeus, one band across anterior margin of frons. Genæ and labium yellow, a pair of yellow spots on inner angles of occipital border. First two segments of antennæ with apical rings of yellow.

Prothorax black, with an orange margin on front and hind lobes and a large orange spot on sides on posteroventral corner. Synthorax black, banded with orange and yellow; an orange humeral stripe broken near wing base, a yellow stripe on middle of metepimeron which does not reach to wing base, and a yellow dash on carina below wing; metepisternum mostly yellow, bordered with black, black invading yellow in upper third of metepisternum for about half its width. Legs black, shaded with orange on tarsi and terminal two-thirds of tibia.

Wings rather broad, hyaline, with dark veins and stigma. Postnodals thirteen or fourteen and twelve or thirteen in forewings and hind wing, respectively. Postnodal crosslines before the base of M_2, four and three in forewing and hind wing, respectively.

Abdomen mostly orange, sternites black. Segment 1 black, with two yellow spots on sides; segment 2 with ventral proximolateral touches of black, apical ring incomplete on dorsum; segments 2 to 6 orange with apical rings of black; segment 7 black on dorsum and halfway down sides, except for ends which, with the area below middle of sides, are orange; segment 8 dorsally black for proximal two-thirds, black emarginate distally; segment 9 similarly black for a little more than proximal half; segment 10 orange, with two dorsolateral spots of dark brown near base. Relative lengths of segments 3 : 6 : 10 : 10 : 10 : 10 : 9 : 5 : 4 : 3. On dorsum of segment 10 a terminal triangular depressed area, bordered proximally by a row of erect, stubby denticles. Anal appendages about as long as segment 10; superiors and processes of subanal plates about equal in length, inferiors somewhat shorter and turned up at tips. Superior appendages dark brown, inferiors black, processes of subanal plates yellow with black tips. (Plate 17, figs. 240 and 241.)

One male from Guara, P. I. 10 VII '03.

CERIAGRION COROMANDELIANUM Fabricius. **Plate 17, figs. 247 and 248.**

FABRICIUS, Ent. Syst. Suppl. (1798) 287, India; SÉLYS, Bull. Acad. Belg. (2) 42 (1876) 528; An. Soc. Esp. Hist. Nat. 11 (1881) 28, Panaon; MARTIN, Mission Pavie (1904) 18 (of reprint), Indo-China, Celebes; RIS, Abhl. Senckenb. Naturf. Ges. 34 (1908) 519; NEEDHAM, Zool. Sinica Ser. A 11 (1930) 263, pl. 19, fig. 10; FRASER, Faun. Brit. Ind. Odon. 1 (1933) 315, fig.

This widely ranging coastwise species is the most uniformly colored damselfly in the Islands; dull yellowish brown all over, only darker above and paler below as usual, and sometimes tinged with reddish, even in old dried specimens; of a more vivid tint in life.

Abdomen 28 to 30 mm; hind wing, 18 to 20.

The nymph of a related species, *C. erubescens*, was described and figured by the senior author in 1930.[15]

Genus PSEUDAGRION Sélys

Four species of this genus have hitherto been reported from the Islands. One of these we have not seen. Three additional species, apparently new to science, have come to light. Mature males of the seven species may be separated by the following key.

Key to the species of Pseudagrion.

ADULT MALES

1. Wings not stalked to anal crossing ..... *pilidorsum.*
   Wings stalked to anal crossing ..... 2.
2. Hind wing more than 25 mm long ..... 3.
   Hind wing less than 25 mm long ..... 4.
3. Sides of thorax and of abdominal segments 9 and 10 reddish .... *crocops.*
   Sides of thorax and of abdominal segments 9 and 10 blue ..... *azureum.*
4. Abdominal segment 10 all black above ..... *microcephalum.*
   Abdominal segment 10 partly blue above ..... 5.
5. Three narrow, closely parallel stripes on front of synthorax .... *flavifrons.*
   A single broad black stripe on front of synthorax ..... *evanidum.*

PSEUDAGRION PILIDORSUM Brauer. **Plate 16, figs. 221 and 222.**

BRAUER, Verh. zool.-bot. Ges. Wien 18 (1868) 553 (in *Agrion*), Manila, Mindanao; SÉLYS, Bull. Acad. Belg. (2) 42 (1876) 514; An. Soc. Esp. Hist. Nat. 11 (1881) 28; ibid. 20 (1891) 218, Sibul; RIS, Nova Guinea 13 (1915) 99, fig., male, appendage, Negros; Suppl. Ent. 5 (1916) 43 (descriptive notes), Formosa.

[15] Loc. cit. pl. 18, figs. 4, 4*a*, and 4*b*.

This handsome reddish-brown species is easily recognized by the hairiness of its back—a feature indicated in its appropriate specific name. Face, femora, and basal abdominal segments rich reddish fulvous, brighter and more extensive in male. Narrowly lined with black are middorsal carina, crest, alar carinæ, and margins of postocular areas on head.

LUZON, Laguna Province, Calamba; Los Baños; Mount Maquiling; Bay, Bangyas; Calauan; Pila: Nueva Vizcaya Province; Bayombong: Cavite Province, Indang; Alfonso: Pangasinan Province, Sison: Tayabas Province, Lucban: Rizal Province, Makabud; Novaliches: La Union Province, Naguilian: Batangas Province, Tanawan, Talisay: Bulacan Province, Malolos: Isabela Province, Naguilian. Mindanao, Cotabato Province, Kidapawan: Zamboanga Province, Kabasalan. Samar. Many specimens from most collectors.

The nymph of *Pseudagrion* has been described and figured a number of times; first by the senior author in 1911,[16] then by Laidlaw in 1915,[17] by Fraser in 1919,[18] and last by Barnard in 1937.[19] Among the known nymphs of cœnagrionines, all of which run to a generally similar form of body, it will be readily recognized by its gills. The gills are long and parallel-sided, divided across the middle into inner and outer halves by a slightly oblique groove. The inner half is coarsely spinulose-serrate along both margins and along the carinate midrib; the outer half is very finely (microscopically) serrate along the edges and a little widened toward the broadly obtuse tip.

The Philippine nymphs before us come from Los Baños, Laguna Province, and they probably belong to the commonest and largest species there, *P. pilidorsum;* for they are large (16 mm + gills, 6 mm) and they show in the venation of the developing wings six crosslines between the subnodal and the base of vein M_2 in the forewing and five in the hind wing; thirteen and eleven postnodal crossveins in the forewing and hind wing, respectively.

These nymphs have but three raptorial setæ on the lateral lobe of the labium, a character that seems to vary, since others referred to this genus have four and five. All have a single mental seta on each side. The gills of this species show den-

[16] Entom. News 22 (1911) 344, pl. 11, figs. 5–8.
[17] Mem. Ind. Mus. 5 (1915) 179.
[18] Rec. Ind. Mus. 16 (1919) 467, pl. 36, fig. 2.
[19] Ann. S. Afr. Mus. 32 (1937) 214, fig. 14, *q. v. s.*

dritic clusters of tracheal branches ranged along the wide transparent marginal areas of the gill lamellæ.

PSEUDAGRION AZUREUM sp. nov.

Abdomen, 39 mm; hind wing, 27.

A handsome blue species, lightly lined on thorax and legs with black, and with dorsum of abdomen mostly black. Face blue up to ocelli, with faint markings of fuscous as follows: three triangular streaks on labrum, one median and two on lateral margins; some faint fuscous dots on anteclypeus; maxillæ and mandibles black except on outer side. A wide band of black extends across the vertex from eye to eye, with a pair of roundish pale spots in it behind lateral ocelli. Occiput blue before and behind. A pair of large quadrate black spots on pale rear of head behind eyes, narrowly connected with black line around upper edge of occipital foramen.

Prothorax blue above, with a narrow continuous blackish marginal line that is straight across the rear border of its middle lobe and sinuous at sides; also a more faint middorsal Y-mark farther forward. Synthorax intense blue in front, carina narrowly bordered with black, as are also the mesothoracic laminæ; from upper angles of latter a pair of rows of dots of faint brownish hue extending upward parallel to carina, growing fainter upward; a single pair of larger isolated dots occupies the prominences of the mesepimeron. Sides blue, with a hair line of fuscous on the humeral suture, expanded into a squarish conspicuous blotch of black on its anterior side near its upper end. A streak of black on upper end of a last suture.

Legs blue, black lines toward knees on outer margins of both femora and tibiæ; tips of all tarsal segments black; spines all black except those of foretarsal comb. Wings hyaline with black veins and stigma. Postnodal crossveins 14 and 12 in fore- and hind wing, respectively. Vein M_2 arising at postnodal seven in forewing and at postnodal six in hind wing.

Abdomen blue, black on dorsum of segments 3 to 7 except for basal narrow pale rings, and with markings on end segments as follows: segment 1 blue except for a blackish basal dorsal twin spot; segment 2 blue with a broad parallel-sided dorsal black band that is narrowly invaded by the blue of the sides toward the apex of the segment and incloses a large middorsal oval spot of blue farther forward; segments 8 and 9 blue except for very narrow black crosslines on their joinings; 10 sim-

ilar, but with these lines widened on dorsum into crossbands that cover most of the dorsum.

Abdominal appendages black above, externally and on terminal teeth; superiors about as long as segment 10, inferiors shorter. Viewed from above the superiors are straight, slightly narrowed to a blunt apex, at the inner side of which is a minute tooth; beneath this tooth the end is dilated below in a flat squarish inflexed plate, and between the two on the end is a little notch that appears more prominently in side view. In lateral view these appendages parallel-sided and blunt; inferiors a little shorter and subpyramidal, with a minute internal tooth just before apex.

Type, a single male specimen "Manila 7 VI 1930 McGregor."

PSEUDAGRION CROCOPS Sélys. Plate 16, figs. 223 and 224.

SÉLYS, Bull. Acad. Belg. (2) 42 (1876) 512; An. Soc. Esp. Hist. Nat. 11 (1881) 27, "Philippines;" KARSCH, Entom. Nachr. 22 (1896) 327; RIS, Nova Guinea 13 (1915) 97, fig., male appendage.

This species we have not seen. It is a large species (hind wing, 28 mm) with the front of the synthorax black, the sides red, the abdomen black with orange markings on segments 9 and 10. We copy (Plate 16, figs. 223 and 224) Ris's figures of the male appendages.

PSEUDAGRION MICROCEPHALUM Rambur. Plate 16, figs. 227 and 228.

RAMBUR, Ins. Neuropt. (1842) 259 (in *Agrion*); SÉLYS, Bull. Acad. Belg. (2) 42 (1876) 504; An. Soc. Esp. Hist. Nat. 11 (1882) 27, Luzon; LAIDLAW, Mem. Ind. Mus. 5 (1915) 179; Rec. Ind. Mus. 12 (1916) 23, fig.; RIS, Suppl. Ent. 5 (1916) 40, 43, 8 figs. of male appendages; FRASER, Rec. Ind. Mus. 16 (1919) 367, nymph; ibid. 24 (1924) 497.

Abdomen, 29 to 30 mm; hind wing, 19.

This widely distributed oriental species is pale blue with three conspicuous black stripes on the thorax, one middorsal and two on the humeral sutures. Top of head blue with a very irregular black cross stripe through the rear ocelli from eye to eye, and three dots (sometimes connected) in a triangle around front ocellus. A spectacled pattern of black surrounding two blue spots on dorsum of prothorax.

Abdomen mostly blue on three segments at each end; segments 7 and 8 blue, except for a very narrow apical ring of black; segment 10 black above for its entire length. Superior appendages (Plate 16, figs. 227 and 228) black, inferiors pale.

PSEUDAGRION FLAVIFRONS sp. nov. Plate 16, figs. 231 to 234.

Male, length, 40 mm; abdomen, 32; hind wing, 19.

Female, length, 41 mm; abdomen, 33; hind wing, 20.

A yellow-faced species, with a 5-striped synthorax and blue-tipped abdomen. Face yellowish, tawny in male, pale yellow in female. Antennæ black, front of two basal segments yellow. Frons all yellow except for a median black dot. Yellow surrounding black-rimmed median ocellus and ending in bottom of a U-shaped black mark between and behind lateral ocelli. A black spot either side of median ocellus; an angulate black streak either side of and in line with paired ocelli; this streak dilated at ends, from each inner end a branch extending obliquely backward to occiput. Behind these streaks postocular areas (not spots) of dull bronzy green extending from eye to eye, narrowly margined behind with black. In the more brightly colored specimens these black-rimmed areas give the top of the head a spectacled appearance.

Prothorax yellowish on dorsum, with a black line across rear of middle lobe and two areas extended forward on that lobe and conjoined to enclose a yellow quadrate area; hind lobe yellow, with a black edging on rear of lateral margin. Synthorax grayish green, striped with black. Three stripes close together, a narrow median stripe covering carina, a wider stripe on each side, conjoined on crest at rear and at collar in front, then extending laterally. A wider stripe covering humeral suture. This stripe even in its middle portion, sinuate and narrowed at both ends. Sides pale greenish olive, with a roundish black spot just above middle of obsolete midlateral suture (sometimes this spot with a tail extending upward), and a black streak in upper part of third lateral suture. Subalar carinæ mostly black-edged.

Wings hyaline, with tawny stigma and brownish veins. Postnodals ten and eight in forewing and hind wing, respectively; front side of quadrangle one fourth and one half length of hind side in fore- and hind wings, respectively.

Legs yellow, with brown spines, femora with stripes of black covering outer sides. Claws yellow, with brown tips.

Abdomen black above, marked with blue, paler below. Dorsum of segment 1 with a quadrate black spot covering its basal half; dorsum of segment 2 blue, with a small black middorsal basal triangle and a goblet-shaped black spot on its apical half.

Base of goblet resting on apical margin of segment, bowl extending forward on a slender stem. On segments 3 to 6 black of dorsum interrupted at base of each segment and constricted with paler just before apex. On segment 7 the black ending jaggedly at two thirds length of segment in a ragged or trifid point. The remainder of segment 7 and all of segments 8, 9, and 10 blue except for carinæ, spines, and joinings. Superior appendages of male (Plate 16, figs. 231 to 234) blackish, inferiors pale, with minute black end tooth on each. Large internal tooth on superiors inclining upward and just visible from side. Another minute tooth halfway from this large tooth to apex.

The female differs in having the black coloration somewhat less extensive though following the same pattern. The large retrorse spines that spring from near the ends of the transverse black line on the prothorax are yellow, with blackish tips. On the abdomen the black of segment 2 is like that of segments 3 to 6, and the sides of segments 8 and 9 are blue, as is also the dorsum of segment 10. The appendages are black, with a yellow edging, or yellow with a black edging.

Type, male, Manila, June 7, 1930.

Allotype, female, from Campus, Los Baños, November 12, 1933 (*J. Tabor, Jr.*).

LUZON, Laguna Province, Los Baños; Pila; Calamba; Bay Bangyas; Rizal Province, Novaliches: Pangasinan Province, Tayug: La Union Province, Naguilian: Ilocos Norte Province, Laoag: Nueva Vizcaya Province. Many males and some females, collected in January, February, April, May, June, November, and December.

PSEUDAGRION EVANIDUM sp. nov. Plate 16, figs. 225 and 226; Plate 20, figs. 292 and 293.

Male, length, 36 mm; abdomen, 29; hind wing, 18.5.

A beautiful turquoise and black species.

Head blue, including eyes, marked with black as follows: Three basal dots on anteclypeus joined by a hairline along frontal suture; antennæ black beyond segment 2; a fairly broad, much broken stripe between eyes across ocelli; a narrow line along occipital border joined to band along edge of eyes and at ocelli, so marking off two large rounded triangular postocular spots with a narrow bar of blue between them.

Prothorax blue, with a black pattern on dorsum which includes two lateral spots and one central-bigeminate blue spot. Synthorax blue, with a broad black stripe on dorsum, a pair of some-

what narrower humeral stripes, a small round dot on middle of side, and a hairline stripe on third lateral suture. Femora black on outer side, blue on inner. Tibiæ and tarsi yellowish, fore tibiæ dark on inner side. Spines black, about as long as distance between them. Wings hyaline, stalked about as far as anal crossing. Postnodals ten or eleven in forewing, eight or nine in hind wing. Stigma dark brown, with a very narrow yellow border, a little more acutely angulated distally than proximally. Front margin of quadrangle a little over one-third length of that of the hind margin in forewing, a little over one-half in hind wing.

Abdomen blue, with a broken middorsal stripe and apical rings of black. Segment 1 with a basal dorsal square spot. Segment 2 with a hastate spot on apical half connected by a stalk with apical ring. Segments 3 to 5 with the stripe starting in a point near base, gradually broadening toward apex, then narrowed to join apical ring. Segments 6 and 7 broader and continuing to widen to end of segment. Segment 8 to 10 entirely blue, except for narrow basal and apical rings of black, broader on segment 10. Terminal black spines on segments 8 and 9. Segment 10 broadly excavate on dorsum of terminal margin. Superior appendages about as long as segment 10, black, bifid at apex in lateral view, in dorsal view broad at tip, and showing a small inner tooth near tip. Inferior appendages less than half length of superiors and sharply angulately truncate.

This species most closely resembles *P. laidlawi* Fraser but differs in the larger size and in the shape of the inferior anal appendages of the male.

LUZON, La Union Province, Naguilian, 9 males, December, 1930 (*Luciano Marzan and A. Estocapio*): Ilocos Norte Province, Laoag, 3 males, January, 1931 (*Manuel Asuncion*).

CŒNAGRION PENDULUM sp. nov. Plate 17, figs. 239, 242, 243, and 246; Plate 21, figs. 300 and 301.

Male, length, 30 mm; abdomen, 25; hind wing, 16.

Female, length, 32 mm; abdomen, 28; hind wing, 17.

A dainty little black and violet-blue species, with black and yellow legs. Face yellow up to level of ocelli, with a black spot just before base of each antenna, a narrow transverse line between but not reaching these spots, and mere touches of brown on median line at junctions of frons and clypeus and of clypeus and labrum, and at outer basal angles of labrum. Antennæ black, except for yellow front of pedicel. A somewhat broader black M-shaped crossline behind middle ocellus, bounding in

front a yellow area that is 3-lobed to rearward, a wide lobe outside each lateral ocellus, and a narrow spur between lateral ocelli. Remainder of top of head black, except for a pair of cuneate postocular yellow spots and a narrow occipital line that does not quite join them.

Prothorax with the intricate pattern of black on yellow shown in Plate 17, fig. 239, in female; in male bands of black a little wider. Synthorax pale violet-blue striped with black as follows: In male a middorsal band a little wider than adjoining pale antehumeral areas, with narrow lines diverging from it on carinæ at both ends; a hairline in humeral suture closely bordered by two incomplete irregular black lines, irregular black line in front widened above, irregular black line behind widened below; descending from subalar carina, another hair line terminating midway on side of thorax in an oval spot (having an appearance that suggested the specific name); below hind wing on third lateral suture a shorter streak. Venter and base of all legs yellow. Black lines in female narrower, middorsal stripe broken into three closely parallel lines. Femora externally broadly black. Tibiæ internally less black. Spines, tips of claws, and joinings of tarsal segments, black. Wings hyaline, with brown veins and paler stigma, the latter twice as long as wide but covering less than one cell. Postnodal crossveins eight and seven in forewing and hind wing, respectively.

Male, abdomen bluish on sides and on segments 8 to 10, with a black middorsal band that is interrupted near apex on segment 1, continuous and broader basally and twice constricted on segment 2, and of similar form on segments 3 to 7; that is, narrowly interrupted at base and a subapical constriction on each. Segments 8 and 9 blue except for hairlines at joinings; segment 10 blue, with a middorsal black line that is dilated at both ends in a somewhat H-shaped figure. Appendages pale except for incised tips. Abdomen of female similar, with less black on dorsum of segment 2. Sides of segments 8 to 10 blue, with a broad black patch covering most of dorsum of segment 8 and half that of segment 9.

This species is nearest *C. barbatum* Needham [20] but notably smaller, with fewer postnodals, with yellowish hairs on face instead of brown, and with many minor points of difference in coloration.

[20] Zool. Sinica 11 (1930) 270, pl. 20, figs. 4, 4*a*.

LUZON, Laguna Province, Los Baños, 2 males and 1 female, October 25, 1931 (*F. Olivares*).

Genus ISCHNURA Charpentier

The two widely ranging species that have been before us from the Islands are very similar in superficial appearance. Segments 8 and 9 of the male abdomen are mainly blue (segment 8 wholly blue) in both, but the black on the dorsum of segment 9 is restricted to the ends of the segment in *senegalensis* and continuous from base to apex in *elegans*. The critical characters are shown in Plate 16. A narrower cleft in the apical hump on segment 10 of *senegalensis*, and an inturned point on the inferior basointernal branch of the superior appendage.

ISCHNURA SENEGALENSIS Rambur. Plate 16, figs. 237 and 238.

RAMBUR, Ins. Neuropt. (1842) 276 (in *Agrion*); SÉLYS, Bull. Acad. Belg. (2) 41 (1876) 273; An. Soc. Esp. Hist. Nat. 11 (1882) 27, Luzon, Cebu, Mindanao; ibid. 20 (1891) 217, Sibul; RIS, Ann. S. Afr. Mus. 18 (1921) 333, figs.; FRASER, Faun. Brit. India 1 (1933) 348, fig., full bibliography.

A common and widely distributed blackish damselfly, with conspicuously shiny metallic-green patches covering postclypeus and segment 2 of abdomen in male. Two round blue postocular spots on black of top of head, labrum bright blue; sides of abdominal segments 1, 2, and 10, and all of segments 8 and 9 except for narrow rings of variable extent at front and rear margins, also bright blue. Apical black ring on segment 9 very variable in extent, almost absent in some of our specimens and wide in others, covering nearly half of dorsum. Cleft apical dorsal margin of segment 10 scarcely elevated above general level in this species.

The superior appendages of male (not well shown in current figures, probably because drawn in a retracted position) palmately broadened beyond base and forked at the end into a stout obtuse outer branch and a long, declined, sigmoid, acute inner branch, nearly as long if directed straight to rearward as inferior appendage. Tips of inner branches of the two appendages convergent.

Numerous specimens from Chamartin, Aug. 12, and a few each for Sobradiel, July 2; Madride, Aug. 1; Alamine, July 13; and Manila, Nov. 9.

ISCHNURA ELEGANS van der Linden. Plate 16, figs. 235 and 236.

VAN DER LINDEN, Opusc. Sci. 4 (1823) 104 (in *Agrion*); SCHMIDT, Thierwelt Mitteleur. 4 (1929) 15, many figs.; FRASER, Faun. Brit. India 1 (1933) 351, figs., full bibliography.

LUZON, Nueva Vizcaya Province, December 26, February 31: Ilocos Sur Province, Candon, January 3: Ilocos Norte Province, Laoag, December 25: Tarlac Province, Tarlac, December 22: Pampanga Province, Magalang, December 27, a few specimens: Laguna Province, Los Baños and vicinity, many specimens.

The nymph of this species has been described by the senior author.[21]

Genus PERICNEMIS Sélys

This little-known genus includes the largest cœnagrionine damselflies in our fauna. Three species have been described, two of them from incomplete males lacking the end segments of the abdomen, and a third from a single female specimen. One of the surprises of this study was the finding of five new species in the material sent us, two of them represented by good specimens of both sexes. This material permits a fuller characterization of the genus than has been possible hitherto. Of the generic characters stated by de Sélys the two emphasized as most distinctive, the 5-sided stigma and the double row of cells following it in the apical costal space, now are seen to hold only for the type species, *P. stictica* Sélys.

Large damselflies, allied to *Amphicnemis* and *Teinobasis*, with similar but more moderate relative length of the abdominal segments and with less basal convergence of veins M_3 and Rs. Vein M_3 arising before subnodus; vein Rs at it, or only a shade beyond. Vein M_1 strongly angulated at stigma, with crossvein at bend forming a triradiate brace, around which the cells are larger than normal. Stigma rhomboidal, narrower in front than at rear. Arculus at second antenodal crossvein. Anal crossing, ac, near level of second antenodal crossvein. Quadrangle rather broad, front side about two-fifths length of posterior side in forewings, three-fifths in hind wings. Between quadrangle and subnodal two crosslines between latter and base of M_2 crosslines varying with species, from three to six. Superior appendages of male longer than segment 10, simple, arcuate, generally longer than inferiors, more or less convergent at tips. The subanal plate bearing a low lateral prominence supporting inferiors. Claws of tarsi lacking the usual inferior denticle (except in *P. mcgregori*).

[21] Dragonflies of China (1930) 283, pl. 18, fig. 17.

Key to the species of Pericnemis.

ADULT MALES

1. Stigma with front side about half as long as rear ..... 2.
   Stigma with front side about four-fifths as long as rear ..... 3.
2. Black and greenish ..... *incallida.*
   Black and yellow ..... *bonita.*
3. Lines of crossveins between subnodal and origin of M_2, four and three in forewing and hind wing, respectively ..... 4.
   Lines of crossveins six and five in forewing and hind wing ..... *flavicornis.*
4. Dorsum of abdomen red; a yellow stripe across rear margin of occiput: labrum with a narrow black border along its basal hinge ..... *mcgregori.*
   Dorsum of abdomen black; no yellow stripe across rear margin of occiput; labrum wholly pale ..... *cantuga.*

We are tentatively listing below three species that are not included in the key: (1) *Amphicnemis glauca* Brauer, which we have not seen and which is known only from the female type specimen; it is placed here because of its apparent agreement in important characters with the female of *P. flavicornis;* (2) *Amphicnemis lestoides* Brauer, which we redescribe and illustrate with a figure of the male genitalia, and another unnamed species from Los Baños, that is very close to *lestoides* but represented in the collections before us only by two discolored female specimens in alcohol.

Brauer's *Amphicnemis lestoides* differs markedly from all the species of the preceding key in that M_3 and Rs arise in contact at the subnodus, run very close together to the first intervening crossvein where they again fuse, to separate slowly and evenly thereafter (Plate 22, fig. 311). It also differs in having the nodus at one-third the wing length; it is a little farther out in the broader wings of the others. It also differs in having the inferior appendages slightly longer than the superiors. De Sélys set it apart from *Amphicnemis* proper as a new subgenus that he did not name. The proper allocation of these species must await more and better material than has been available to us.

PERICNEMIS INCALLIDA sp. nov. Plate 18, figs. 254 and 255; Plate 22, fig. 305.

Male, length, 59 to 65 mm; abdomen, 50 to 56; hind wing, 34 to 36.

A big smooth greenish-brown species with long blackish abdomen. Head greenish black above, with a white ring around tip of basal antennal segment and a small white streak running

obliquely downward on frons from base of each antenna. Flagellum of antenna brown. Face black and white; postclypeus shiny black, bordered in front and behind with white; anteclypeus white, and also lower margin of frons. Labrum black, basally margined with yellowish-white in front, and invaded by a pair of oblique pale streaks from rear. Occiput narrowly margined with dull yellow on its straight midborder, and more broadly margined on bulge behind eyes.

Prothorax obscure greenish above, paler beneath, front border narrowly blackish. The hinder lobe broadly expanded to rearward in a scooplike plate that overlies front of mesothorax and again expanded in a blunt laterally directed process on each posterolateral angle. Both expansions thin and platelike, not spinelike. Synthorax greenish or brownish with an overcast of green, dark on dorsum, gradually paling downward to yellowish sternum, without pattern.

Legs yellowish, with brown spines. A brown external line on all femora, expanding at end to surround knees, three tarsal segments severally tipped with brown. Larger spines in the outer rows on the femora two, four, and six on forelegs, middle legs, and hind legs, respectively.

Wings hyaline and strongly iridescent. Postnodal crossveins fifteen and thirteen in forewing and hind wings respectively. Crosslines between base of subnodal and base of M_2 six and five in forewing and hind wing, respectively. Stigma rhomboidal, about half as long in front as behind in both wings.

Abdomen brownish above, darkening toward tip, becoming yellowish on sides, more broadly on segments 1 and 2 (greenish yellow), and on segments 8, 9, and 10 (brownish yellow). Appendages brown, paler internally, equal in length, simple; bowed superiors with a median inferior platelike dilation that extends across their concave under side like the cord of a bow.

LUZON, Laguna Province, Los Baños, 1 male (*F. Juan*), 2 males, April 19 (*F. Juan*): Tayabas Province, Quezon Park, 1 male, May 3 (*F. Juan*). SAMAR, 1 male, smallest of the lot, June 2 (*McGregor*).

PERICNEMIS BONITA sp. nov. Plate 18, figs. 260 and 261; Plate 22, fig. 306.

Male, length, 61 mm; abdomen, 53; hind wing, 31.

Female, length, 55 mm; abdomen, 45; hind wing, 32 to 35.

A yellow and black species in the male, greenish olive and black in the female. Head of male velvety black above, black overlaid with a pair of large greenish triangles on broad slopes adjacent to eyes. In front of these triangles a pair of curved

yellow streaks lying with their pointed inner ends toward ocellar triangle. Outer face of the two basal segments of antennæ yellow: a black inverted U-shaped spot covering most of postclypeus, with a faint black dash extending from its base around lateral margin of that sclerite. Labrum rotund, bright yellow, with a blackish streak on its basal lateral margins. Occiput yellow-margined from eye to eye, yellow widened on straight middle portion, with three small divergent spurs of that color projecting forward into the black.

Prothorax yellow, black across edge of front lobe and in a blotch on each side of middle lobe. The hind lobe slightly produced backward in middle, but posterolateral angles long and blunt. Synthorax bright yellow, with a deep black middorsal stripe on front that is completely divided by a yellow carina. This stripe narrow in its upper portion, forked at top where it runs out laterally along crest, greatly widened at front where it runs down laterally to mesepisternum. Touches of brown about wing roots.

Legs yellow, with brown spines and touches of brown above and below knees. Large spines of outer row three, four, and five on fore, middle, and hind femora, respectively. Wings hyaline; postnodal crossveins sixteen and fourteen in forewings and hind wings, respectively. Crosslines between subnodal line and base of M_2 six or seven and five or six in forewing and hind wing, respectively. Stigma rhomboidal, with front side a little more than half as long as hind in both wings.

Abdomen blackish above, the black deepening to rearward and spreading down the paler sides until it almost covers segments 7 to 10; yellow beneath. Appendages brown, paler within. Subanal plate with a nipple-shaped lateral prominence.

Female much less brightly colored, synthorax greenish olive, darker but without pattern middorsally. Postclypeus wholly black; other head markings less distinct than in male. Wing membrane slightly tinged with brownish, the long ovipositor yellow.

LUZON, Laguna Province, Mount Maquiling, 1 male and 1 female, January 28, 1930 (*A. C. Duyag*), 1 female, April 23, 1930 (*A. C. Duyag*), 1 male, May 27, 1930 (*A. C. Duyag*).

PERICNEMIS MCGREGORI sp. nov. Plate 18, figs. 256 and 257; Plate 21, fig. 303.

Male, length, 52 mm; abdomen, 44; hind wing, 25 to 26.

A bronzy, yellow-legged species, with a blackish abdomen that widens at the tip with a trumpetlike flare and bears hook-shaped

superior appendages. Head bronzy black above, with black antennæ that are white-ringed on the basal segment. Circular labrum green, with a narrow black basal hinge line, from which a short median streak of the same color projects forward. Ante- and postclypeus greenish, mottled with black. Occipital border yellow-margined only in the middle.

Prothorax olive-green above, overlaid in the middle with yellowish. Hind lobe narrow, not at all produced at hind angles. Synthorax yellowish olive, more yellowish in region of humeral suture, without definite pattern.

Legs yellow, including spines and claws, with no striping; knees only faintly darker. Claws beneath bearing a distinct denticle. Femoral spines of outer row three, four, and six on forelegs, middle legs, and hind legs, respectively. Wings hyaline with brown veins and golden bronze stigma bordered by a yellow line within the heavy veins. Stigma rather regularly quadrangular, front margin almost as long as rear. Postnodal crossveins thirteen and eleven in forewings and hind wings, respectively. Crosslines between nodal and base of M_2 four and three, fore and hind. Veins M_3 and Rs wide apart at origin, latter at subnodus, but moderately approximated on first intervening crossvein.

Abdomen brown above, this color overspreading apical segments but leaving sides of segments 1 and 2 yellow. Segments diminishing in length from middle outward, length of segments 7 to 10 approximately 10 : 4 : 3 : 2. The last three segments wider, with a trumpetlike flare to rearward. Sigmoid inferior appendages longer than segment 10, much shorter than hooked superiors. These appendages black, hooked superiors brownish at base and within. Subanal plates densely clad with golden hairs, each bearing at the outer side a low pyramidal tubercle.

There are two male specimens of this unique species.

LUZON, Laguna Province, Ube, 2 males, April 24, 1930 (*McGregor and Celestino*).

This species is tentatively placed here for want of a better location, although it differs from the others described above in the form of rear end of abdomen and appendages, in the wider separation of M_3 and Rs at the origin, in the form of the stigma, and in having a distinct denticle under the tip of the tarsal claws.

PERICNEMIS FLAVICORNIS sp. nov. Plate 18, figs. 262 to 264; Plate 21, fig. 304.

Male, hind wing, 32 mm.

Female, length, 45 mm; with abdominal segments 7 to 10 missing; hind wing, 31.

A black and green species, with hyaline wings and yellowish-margined stigma.

Head black above, middle of occipital border narrowly yellow, an isolated yellow spot before base of each antenna. The same color ringing apex of antennal segment 1 and covering front of segment 2. Face bluish green, with two broad black cross stripes, one across base of labrum, the other covering postclypeus. Front margin of labrum narrowly yellow and fringed with long stiff hairs of same color. Rear of head and under side of mouth parts bluish green.

Prothorax brown across middle lobe, greenish at sides, with a narrow black line on anterior margin of front lobe, and a wide black band covering straight-edged hind lobe except at ends. Ends projecting laterally, then turning backward with the slant and curvature of the horns of the water buffalo, yellowish. A broad middorsal black band covering front of synthorax narrowly divided by a yellow line on carina, five yellow lines on edges of crest, both within and without. Sides obscurely clouded with bluish green, deeper green on subalar carina. Venter yellowish.

Legs yellow. Femora with a streak of brown on dorsal side that expands into a spot at the knees. Spines brown. Orange claws toothless or with a scarcely discernible rudiment of the usual inferior tooth beneath tip. Wings hyaline-iridescent, with a brown stigma bordered by heavy fuscous veins that are narrowly margined within by a line of yellow, and also without on the inner and posterior sides. Postnodal crossveins fourteen or fifteen and thirteen or fourteen on forewing and hind wing, respectively. Arculus at second antenodal. Vein M_3 arising a little before subnodus, Rs at or its own diameter beyond, the two veins converging and closely approximated at first intervening crossvein. Between subnodus and base of R_2 seven lines of crossveins in forewing and five in hind wing. Quadrangle half as long on front border as on hind border in forewing, two-thirds as long in hind wing. Anal crossing, ac, almost at level of second antenodal, a trifle shorter than inner end of quadrangle.

Abdomen black above from end to end, width and intensity of this color increasing to rearward until it almost completely overspreads segments 8 to 10. Side of segment 1 bluish green with a narrow black line on apical transverse carina; segment 2 of same color in its basal half, beyond which it is yellow. Segments 3 to 5 missing from this specimen: 6 broadly yellowish

beneath, 7 obscurely so; 8 and 9 narrowly so; segment 10 again more broadly so, especially at base and rearward to black marginal ring. Appendages of the form shown in Plate 18, figs. 262 and 263, superior strongly bowed and obliquely placed, both pairs convergent at tips and both bright yellow with black tips.

The female differs in having an extra pair of minute oblique hyphen-shaped yellow marks on the top of the head midway between the eyes and the ocelli, and a little less black pigment on the labrum and elsewhere. It agrees closely with Brauer's description of his *Amphicnemis glauca* in structure and proportions of the apical segments of the abdomen, but differs in color, having no blue on the dorsum of these segments which are black above to the end.

LUZON, Mountain Province, Baguio, 1 male and 1 female (*Lt. Col. Robinson, U. S. A.*)

PERICNEMIS CANTUGA sp. nov. Plate 18, figs. 252 and 253; Plate 22, fig. 307.

Male, abdomen, 59 mm; hind wing, 30.

A larger species than the preceding but similar to it except in minor details that I take to be specific. Unfortunately the body colors are lost in the single alcoholic specimen available, but the head pattern, venation, and the male appendages will serve for recognition.

Head greenish black above, with a pair of small yellow streaks between antennæ and lateral ocelli. Apex of basal antennal segment ringed with whitish. Pale hue of face extending upward to base of antennæ. Postclypeus pale, traversed with two blackish crossbands, anterior crossband wider. Anteclypeus pale, marked with black on its four corners, from middle of its front margin a black dash extending forward a little way across greenish labrum. Straight middle portion of occipital border narrowly margined with yellow.

Flat hind lobe of prothorax narrowly margined with yellow. Body colors lost in alcohol. Legs wholly yellow, including spines and claws. Wings hyaline. Postnodal crossveins fourteen and thirteen in forewing and hind wing, respectively; crosslines four and three between subnodal and base of M_2.

Abdomen blackish, darkening apically, paler beneath. Yellow of underside of segment 10 extending in a large square area upward on sides of segment, but not reaching apical margin; outrolled edge of apical margin black, this color extending upward and across the elevated and basally emarginate middorsal border. Appendages yellow except for their incurved toothlike

tips, these tips minute on superiors but very much larger and offset by a groove on inferiors.

The species seems to differ from *P. mcgregori* in much larger size, in having yellow streaks on the vertex and a yellow hind margin on the prothorax, and in the form of the tips of the appendages.

MINDANAO, Surigao Province, Mount Cantugas, 1 male, the type, in alcohol, March 17, 1931 (*A. C. Duyag*).

PERICNEMIS GLAUCA Brauer.

BRAUER, Verh. zool.-bot. Ges. Wien 18 (1868) 542 (in *Amphicnemis*), female, Luzon; SÉLYS, Bull. Acad. Belg. (2) 43 (1877) 121 (in *Telebasis*); Ann. Soc. Esp. Hist. Nat. 11 (1888) 28 (in *Telebasis*), Mindanao.

This species we have not seen. It is known as yet from a single female specimen. Brauer's description of that specimen indicates close agreement, except for minor details, with the female of our *P. flavicornis*. For that reason we are tentatively transferring the species to this genus. The front of the stigma is hardly shorter than the rear. There are eighteen postnodal crossveins. The synthorax is bluish in front, with a yellow carina. The abdomen is blackish above, with segment 8 partly and segments 9 and 10 wholly blue. In this coloration of the end segments *glauca* differs markedly from the female *flavicornis*, which has them wholly blackish above. The hind wing of *glauca* measures 29 mm.

PERICNEMIS LESTOIDES Brauer. Plate 18, figs. 258 and 259; Plate 22, fig. 311.

BRAUER, Verh. zool.-bot. Ges. Wien 18 (1868) 541 (in *Amphicnemis*), Mindanao; SÉLYS, Bull. Acad. Belg. (2) 43 (1877) 130 (in *Amphicnemis*); An. Soc. Esp. Hist. Nat. 11 (1882) 29 (in *Amphicnemis*).

Male, abdomen, 48 mm; hind wing, 29.

A black-backed species, with long yellow abdominal appendages. Head entirely black above. Vertical face of frons with an isolated yellow transverse stripe that is divided by black in the middle. Postclypeus black. Anteclypeus and mandibles pale, marked with diffuse spots of brown. Labrum shiny black, a broad front border of yellow, and a fringe of long yellow hairs.

Prothorax shiny greenish black above, yellow beneath; an isolated stripe of yellow across frontal lobe, yellow of coxæ, narrowly invading lower edge of black above them. Black hind lobe produced, elevated in a low obtusely triangular plate. Synthorax entirely shiny black in front, down to midlateral suture

and a little farther at ends; down on mesinfraepisternum below, back to hind wing roots above.

Legs yellow, with a brown line on back of femora (expanded at knee to form a half ring) on inside of tibiæ with reddish brown spines and claws. Five long spines in outer row on middle and hind femora. Wings hyaline, with brown veins and pale-brown stigma, bordered with paler inside heavy marginal veins and obliquely placed, and about three-fifths to four-fifths as long in front as behind. Postnodals fourteen. Crosslines between subnodal and base of M_2 seven and five in forewing and hind wing, respectively. Base of M_3 slightly before (sometimes at) subnodus, where Rs also originates, the two running almost parallel and very close together to their union (and, sometimes their consolidation) upon first intervening crossvein.

Abdomen black above, darkening toward tip, with segment 10 above becoming shiny greenish black; yellowish beneath. Length of last four segments 10 : 4 : 3 : 2. Appendages and anal plates light yellow, nearly twice as long as segment 10, slightly tapered outward from their diverging bases, then extended parallel to their tips, which end in single brownish converging denticles. Inferiors very slightly longer than superiors, both, as Brauer described them, long and finger-form.

MINDANAO, Surigao Province, Mainit, 2 males, April, 1931 (*A. C. Duyag*).

PERICNEMIS sp?

At least one additional smaller species, represented by imperfect specimens, but having the excessive length of the abdomen, the form of the wing, and the basal conformation of veins M_3 and Rs of *P. lestoides*, is before us.

LUZON, Laguna Province, Los Baños, 2 females in alcohol, April 24, 1931 (*F. Juan*).

AMPHICNEMIS FURCATA Brauer.

BRAUER, Verh. zool.-bot. Ges. Wien 18 (1868) 543 (no locality); SÉLYS, Bull. Acad. Belg. (2) 43 (1877) 127; An. Soc. Esp. Nat. Hist. 11 (1882) 29.

Male, abdomen, 37 mm; hind wing, 21.

This species we have not seen. The position of vein M_3 at origin (just beyond the subnodus) and the excessive length of the abdomen as compared with that of the hind wing would seem to ally it to *Teinobasis*. The shape of its stigma (one

third shorter in front than behind) is like in *Pericnemis,* and the long S-shaped processes springing from the outer angles of the hind lobe of the prothorax are very peculiar. A definitive generic allocation must await new and adequate material for study.

De Sélys referred Brauer's *A. glauca* to *Teinobasis.* Possibly this was a mistake. He may have intended to so transfer *A. furcata* to that genus.

Genus TEINOBASIS Kirby

These are slender damselflies with extreme elongation of the middle abdominal segments, so that the abdomen is very much longer than the wings. The legs are rather short and weak, with rather few spines of very moderate length. The side pieces of the synthorax are very strongly aslant, making an angle with the perpendicular of at least 75°.[22]

Wings stalked beyond level of middle of quadrangle, the portion beyond unusually narrowed, resulting in basal convergence or consolidation of veins M_3 and Rs.

This convergence is at the first intervening crossvein in one group of species, these veins remaining well apart at their origin.[23] The fusion is more or less complete from the middle fork out to or beyond that crossvein in the remaining species. The arculus is generally a little beyond the second antenodal crossvein, and the base of vein M_3 is generally beyond the subnodus. Between the quadrangle and the line of crossveins descending from the subnodus there are two other crosslines of them.

The tip of the male abdomen is peculiar in two respects. The middorsal apical margin of segment 10 is depressed in a shelflike semicircle from the floor of which may arise a pair of minute teeth. The appendages appear to be in three pairs, and this appearance has given rise to diverse interpretations of homologies. Both Brauer and de Sélys thought the inferior appendage to be deeply branched; also, latterly, Lieftinck.[24]

[22] The maximum skewness of this angle as recorded by Needham and Anthony [Journ. N. Y. Ent. Soc. 11 (1903) 123] for Odonata in general was 72° in *Aciagrion.*

[23] This type of vein behavior is further evolved in *Paramecocnemis* [Lieftinck, Nova Guinea 15 (1932) 21, fig. 9], veins M_3 and Rs being confluent for a distance of nearly two cells beyond the subnodus while remaining well apart at their bases.

[24] Nova Guinea 15 (1932) 582.

Both Ris and Campion thought the upper one was deeply branched. May not the lower one be the uniquely pointed, elongated, and chitinized apex of the subanal plate, extended beneath and supporting the slender inferior appendage? The unique feature in this genus seems to be that thus the subanal plate is pressed into service as a copulatory organ. A more careful study of homologies is needed for these parts.

Of the seven species hitherto described from the Philippines five have been before us, and in addition, four others that appear to be new. The ten appear to be distinguishable by the characters stated in the key below. However, the ultimate criteria of the species will be found in the form of the genitalia of the male, and these we have figured in so far as they are available in our material.

Key to the species of Teinobasis.

1. Veins M_3 and Rs widely separated at origin but converging at once upon first intervening very much shortened crossvein ..... 2.
   These veins fused in a common point at origin and generally fused for a first cell length; first crossvein eliminated by the fusion ..... 5.
2. Dorsum of synthorax metallic black; a blunt tooth arising from middorsal carina ..... *dentifer.*
   Dorsum of synthorax red or yellow ..... 3.
3. Small species (hind wing, 20 mm); superior appendage with an internal toothlike prominence: head and abdominal segment 1 greenish above. *filiformis.*
   Larger species (hind wing, 23 to 26 mm); no green color ..... 4.
4. Postclypeus and top of head black ..... *filum.*
   Postclypeus and top of head reddish ..... *filamentum.*
   Postclypeus pale; a crown-shaped black line between the antennæ ..*corolla.*
5. Anal crossing nearer second antenodal than first; basal fusion of veins M_3 and Rs incomplete for first interval ..... 6.
   Anal crossing nearer first antenodal than second: basal fusion of veins M_3 and Rs complete ..... 7.
6. Tip of male inferior appendage and appendagelike subanal plate divergent; superior appendage bilobed at apex ..... *nigra.*
   Tips of these appressed: superior appendage entire at apex .... *strigosa.*
7. Abdominal segment 7 of male pale in its apical half ..... *recurva.*
   Abdominal segment 7 blackish ..... 8.
8. Abdominal segments 8 and 9 of male bluish ..... *samaritis.*
   Abdominal segments 8 and 9 of male blackish ..... *olivacea.*

TEINOBASIS DENTIFER sp. nov. Plate 19, fig. 278; Plate 21, fig. 299.

Female, length, 48 mm; abdomen, 41; hind wing, 25.

A bronzy black species with pale legs that bear a few strong spines. Head bronzy black above, with a low straight occipital border and a conic prominence arising between eye and occiput. Face yellowish, crossed by two broad black transverse bands,

one covering basal half of labrum, the other the postclypeus. Yellow of edge of frons widened upward at edge of eye.

Entire thorax metallic greenish black above, pale yellowish below. Middle lobe of prothoracic dorsum smooth, anterior lobe a low ridge, posterior lobe very peculiar, with broadly triangular middle portion inclined to rearward and bilobed at tip, and its lateral extension erect and denticulate at tip. On middorsal carina of synthorax at about one fourth its height arises a blunt tooth that is directed straight forward. Bronzy green of synthorax extending down the sides evenly almost to middle coxa at front and to hind wing roots at rear.

Legs yellowish; femora indistinctly streaked with brown externally, middle and hind femora bearing each four stout spines in external row, tibiæ five, with a smaller additional at end.

Wings hyaline with brown veins. Postnodal crossveins 14 and 12 in forewings and hind wings, respectively. Arculus at second antenodal; anal crossing at almost same level. Vein M_3 arising at subnodus, Rs a little farther out. These two veins converging abruptly to a short crossvein and then slowly diverging, with six and four (forewing and hind wing) lines of crossveins intervening before origin of M_2. Stigma about as wide as long in front, a little longer on hind margin, especially in forewing.

Abdomen brown above, paler beneath. Dorsum of segment 1 almost covered by a black crescent that is broadly concave to rear; segment 2 blackish with greenish reflections; segments 3 to 7 brown, dorsum darkening, sides becoming more yellowish to rearward; segments 8 and 9 mainly yellow at sides, the fuscous forming merely a broad dorsal stripe, with an isolated fuscous streak at base of ovipositor; segment 10 black, except for a narrow pale apical margin. Supra-anal plate black. Appendages pale brown, ovoid, pointed, about as long as segment 10, a little surpassing pale subanal plates.

There is a single adult female from Davao Province, Mindanao. It is in a broken condition but shows the characters that will serve for specific recognition. Its type of coloration is not that of any of the known females from Mindanao.

TEINOBASIS FILUM Brauer. Plate 19, figs. 275 and 276.

BRAUER, Verh. zool.-bot. Ges. Wien 18 (1868) 545, male, Mindanao (in *Amphicnemis*); SÉLYS, Bull. Acad. Belg. (2) 43 (1877) 124 (in *Telebasis*); An. Soc. Esp. Hist. Nat. 11 (1882) 543 (April 5 to September 8).

Male, abdomen, 38 mm; hind wing, 23.

We have a single male specimen, bearing no locality label but dated February 11, 1930, and collected by F. Rivera. Was it from Mindanao? Abdominal segments 8 to 10 are reddish and not blackish as described by Brauer; but that and a less extensive darkening of the face is probably due to immaturity. The appendages are shown in Plate 19, figs. 275 and 276.

TEINOBASIS NIGRA Laidlaw. **Plate 19, figs. 273, 274, and 287; Plate 22, fig. 309.**

LAIDLAW, Proc. Zoöl. Soc. Lond. (1928) 136–138, male.

Abdomen, 36 mm; hind wing, 21.5.

This species, which has been known hitherto from a single male specimen, is very abundant in Luzon. We have many specimens of both sexes, mostly collected about Los Baños, Laguna Province, and Novaliches, Rizal Province. It is a rather small blackish species with yellowish legs streaked with black externally on the tibiæ and across the apices of the tarsal segments. The female has the top of the head mostly black like the male, but the body is paler, the thorax olivaceous, the abdomen fuscous above, paler beneath, tending toward a rich reddish brown on segments 8 to 10, including the ovipositor. The appendages of the male are shown in Plate 19, figs. 273 and 274.

Many specimens, both male and female, from numerous localities in Luzon.

TEINOBASIS FILAMENTUM sp. nov. **Plate 19, figs. 277, 285, and 286; Plate 21, fig. 298.**

Male, length, 50 mm; abdomen, 45; hind wing, 25.

Female, length, 45 mm; abdomen, 40; hind wing, 26.

An exceedingly slender clear-winged species with blackish abdomen.

Male.—Head all red except eyes and a minute point at each end of labial hinge, paler beneath. Labrum fringed with stiff golden hairs.

Thorax all red except for a black point at each wing root and another at junction with abdomen on each side. Legs red, including spines and claws. Wings hyaline, with brown veins and stigma. Arculus beyond second antenodal crossvein. Postnodals fifteen and fourteen in forewing and hind wing, respectively. Vein M_3 arising a little beyond nodus; Rs a distance beyond that. These two veins converging strongly to first intervening crossvein, which is very short, hardly longer than the diameter of a vein. Beyond them and before the base of M_2 intervening crossveins six in forewing and five in hind wing.

Crossvein ac about twice its length before level of second antenodal. Wing stalked beyond middle of quadrangle.

Abdomen with segments 7 to 10 excessively attenuated. Segments 1 and 2 and base of segment 3 red, with only shaft of penis black. A blackish band covering dorsum of segment 3 beyond base to segment 7, narrowed at base and widened toward apex of each segment. Venter pale yellowish. Segments 8 to 10 blackish, 8 and 10 paler beneath. Segment 10 slightly notched in middle of black-edged posterior dorsal margin. Appendages brown, superiors two-thirds as long as inferiors, superiors ( )-shaped as viewed from above, with broadened bases and blunt tips. The somewhat paler inferiors straight, with spindle-shaped and sharply pointed tips. Viewed from the side the superiors arch upward from the base and the inferiors downward. Beneath the latter the subanal plates carrying a stout process as long as superiors and twice as wide as inferiors, obliquely truncate on end to form a sharp downwardly directed tip. This process was misinterpreted by Brauer as a lower branch of the inferior appendages.

Female.—Female similar to male but paler on head and thorax and the brown of dorsum of abdomen diffusely covering dorsum of basal segments. On the face a pair of little streaks of black on ends of labral hinge, another convergent pair descending from base of antennæ. The female carries three conspicuous black points that the male seems entirely to lack, two on the outer angles of a thin plate that rises erect from the transverse carina at the front of the mesothorax, and a third on the midventral line between the bases of the middle legs. Both front and rear margins of the prothoracic dorsum rise in thin erect ridges, the anterior broadly rounded, the posterior truncate.

This species is nearly allied to *T. filum* Brauer, from which it differs in the larger size, in having face and top of head yellow, and in the form of the male appendages.

We have a single pair from Kolambugan, Mindanao, May.

TEINOBASIS COROLLA sp. nov. Plate 19, figs. 271, 272, and 288.

Male, abdomen, 41 mm; hind wing, 24.

A slender species with reddish head, yellow legs, darkening abdomen, and a black crown spot on its head. Head otherwise yellow, including labrum and postclypeus. Antennæ blackish with apical yellow rings on the two basal segments. Crown spot continuous across prominence of frons, invaded from rear by

three yellow spots. Black borders of middle triangular yellow spot conjoined in rear around middle ocellus.

Thorax entirely reddish except for the two usual black points at the roots of forewing and hind wing, and at the junction with the abdomen on each side. Legs wholly reddish yellow, including spines and claws. Wings hyaline, with brown veins and black stigma. Postnodal crossveins thirteen and eleven or twelve in forewing and hind wing, respectively. Front side of quadrangle half as long as hind side in forewing, two-thirds as long in hind wing. Vein M_3 arising just beyond subnodus, Rs much farther out, the two almost or quite conjoined on the first intervening crossvein. Stigma parallel-sided, or a trifle shorter in front than behind in the forewing only. Between the nodal line of crossveins and the base of M_2 there are in the forewing six and in the hind wing five crosslines. Anal crossing a little nearer to second antenodal than to first.

Abdomen all reddish yellow on two basal segments (except for the shaft of the penis which shows by transparency and is black) and pale beneath to a lessening degree beyond, with widening of pale color at extreme base and at apex on segments 3 to 7. Segments 3 to 10 black above, the black on segment 9 expanded downward from apex in a diffuse blotch covering most of sides of segment. Appendages black, and of the form shown in Plate 19, figs. 271 and 172.

Female similar to male but paler. Crown stripe between bases of antennæ broken in middle into two U-shaped marks that lie next to antennæ, abdomen not black above beyond two basal segments but only a little darker than they are.

This species is close to *T. filum* and *T. filamentum*, but differs in the crown spot, in the blotch of black on the sides of abdominal segments 9, and in the form of appendages.

Two males, one with the tip of the abdomen missing, from Cavite.

LUZON, Rizal Province, Makabud, 1 female, collector unknown.

TEINOBASIS STRIGOSA sp. nov. Plate 19, figs. 281 and 282.

Male, length, 52 mm; abdomen, 43; hind wing, 27.

Female, length, 48 mm; abdomen, 39; hind wing, 26.

A slender blackish species overcast with dull metallic green. Head in male wholly greenish black above and on face except for two pale cross stripes, one covering anteclypeus and the other on frontal suture. Margin of matt black labrum fringed with coarse hair. Surface of postclypeus shiny black. The two basal segments of antennæ streaked with yellow.

Prothorax greenish above and pale beneath, synthorax the same, with dark on dorsum farther overspreading sides, but with no definite color pattern. Legs pale, armed with brown spines and with touches of brown on knees, on rear of front femora, and on tarsal segments. Wings subhyaline, iridescent, with dark-brown veins and stigma, pale-margined within its heavy bordering veins. Postnodal crossveins fifteen and fourteen in forewing and hind wing, respectively. Quadrangle less than half as long on front as on rear border in forewing, three-fifths as long in hind wing. Anal crossing, ac, unusually near level of arculus. Basal fusion of veins M_3 and Rs often incomplete, but variable. Always these veins seem to arise at a common point and become completely fused at the bend, eliminating the crossvein there.

Abdomen blackish above for its entire length, with rings of deeper color on apical circular carinæ of all segments; yellowish beneath, more broadly on segments 1 and 2, and in large isolated pale blotches on sides of segments 8 and 9. These diffuse pale areas not extending to end of these segments, where the sides are broadly black. Appendages (Plate 19, figs. 281 and 282) black; under side of subanal plate yellowish. Slender abdomen becoming widened on segment 7 to a clavate tip.

Female similar to male in head coloring except that the black of the clypeus is diluted and the labrum is mostly reddish yellow, only a basal line on hinge with three streaks extending forward from it are black. Two of these streaks marginal, the other median. Thorax wholly pale reddish yellow, with only dorsal sutures brownish. Legs as in male. Abdomen colored much as in male but paler—much paler on terminal segments, their apical margins and ovipositor yellow. A longitudinal streak of brown on sides of segment 8 above base of ovipositor.

A number of males and a few females from southern Luzon.

TEINOBASIS RECURVA Sélys. Plate 19, figs. 283 and 284.

SÉLYS, Bull. Acad. Belg. (2) 43 (1877) 114, Mindanao, male (in *Telebasis*); An. Soc. Esp. Hist. Nat. 11 (1882) 28, Mindanao; ibid. 20 (1891) 218, Sibul, Bulacan; RIS, Denkschr. med-naturwiss. Ges. Jena 13 (1908) 103.

We have a single male specimen rather larger than the type (hind wing 26 instead of 23 to 24 mm) and much infuscated with age but still showing the distinctive characters cited by de Sélys in the original description: Abdominal segment 7 pale in apical half except for a black transverse apical carina; apices

of inferior appendage and subanal plate (his two branches of the former) divergent. It comes from Santiago, Agusan, Mindanao, and was collected in April, 1931.

Its genitalia most strongly resemble those of *T. strigosa*.

TEINOBASIS SAMARITIS Ris. Plate 19, figs. 279 and 280.

RIS, Denks. med.-naturwiss. Ges. Jena 13 (1908) 103, male and female, Catbalogan, Samar, April 19 to 26, fig. of male appendage.

Male, abdomen, 39 mm (?); hind wing, 24.

Female, abdomen, 40 mm; hind wing, 25.5.

In the freshest of the specimens of this species abdominal segments 8 and 9 are distinctly paler than the others (probably blue in life). Old infuscated specimens are specifically identifiable by the caudal appendages of the males. They are shown in Plate 19, figs. 279 and 280.

Many specimens from Luzon and 1 male from Kabasalan, Zamboanga Province, Mindanao.

TEINOBASIS OLIVACEA Ris. Plate 19, figs. 269, 270, and 289; Plate 22, fig. 308.

RIS, Denkschr. med.-naturwiss. Ges. Jena 13 (1908) 102, male and female, figs. of wing and male appendages, Naujan, Mindoro.

Male, abdomen, 42 mm; hind wing, 26.5.

Female, abdomen, 40 mm; hind wing, 27.

This species and the preceding are very similar in general appearance (at least in old discolored specimens such as have been before us), and are readily separable only by the form of the terminal appendages of the male, which are distinctive. Both were figured by Ris in the work above cited.

Many specimens from various localities in Luzon.

SUMMARY

In the foregoing pages and in Part I, Anisoptera, there are recognized 153 species of Odonata distributed in 74 genera, including 25 new species and 3 new genera; also *Nannophya pygmæa*, that was mentioned in Part I merely as regional, but that has since been reported from Kolambugan, Lanao Province, Mindanao, May, 1932. The most unexpected find is that of 5 new species of the little-known genus *Pericnemis*, not hitherto reported from the Islands at all.

Described and illustrated are the nymphs of 17 species that have not heretofore been made known. The most interesting and significant of these new nymphs are *Heteronaias* in Anisoptera, and *Rhinagrion* and *Prionocnemis* in Zygoptera.

ERRATA IN PART I

Page 21, line 6 last letter, *for* n *read* m.
57, last heading, *for* ODIOPHYA *read* IDIOPHYA.
81, line 7, *for* in *read* on.
97, Fig. 20, *for* female *read* male.
100, Text fig. 1 at bottom line 3, for *savi* read *sayi*.

ILLUSTRATIONS

[Plates and figures are numbered continuously through Part I, Philip. Journ. Sci. 63 (1937) 21, and the present paper.]

PLATE 11

FIG. 131. *Rhinocypha colorata* Sélys (supposition), nymph.
132. *Rhinocypha colorata* Sélys (supposition), enlargement of tip of nymphal labium.
133. *Rhinocypha colorata* Sélys (supposition), nymphal labium.
134. *Rhinocypha colorata* Sélys (supposition), lateral view of tip of abdomen of nymph: L, base of lateral gill rudiment, M mesal gill rudiment.
135. *Rhinocypha colorata* Sélys (supposition), mandible (articulate tooth of inner face indicated by dotted line.)
136. *Euphæa refulgens* Sélys, mandible of nymph.
137. *Euphæa refulgens* Sélys, enlarged tip of nymphal labium.
138. *Euphæa refulgens* Sélys, tip of lateral lobe of nymphal labium.
139. *Euphæa refulgens* Sélys, ventral view of half of abdomen, segments 1 to 9, showing ventral gills.
140. *Euphæa refulgens* Sélys, nymph.

PLATE 12

FIG. 141. *Rhinocypha colorata* Sélys, male, anal appendages, dorsal view.
142. *Rhinocypha colorata* Sélys, male, anal appendages, lateral view.
143. *Rhinocypha colorata* Sélys, male, anal appendages, dorsal view of another specimen, showing slight variation.
144. *Rhinocypha colorata* Sélys, male, lateral view of anal appendages shown in fig. 143.
145. *Rhinocypha semitincta* Sélys, male, anal appendages, dorsal view.
146. *Rhinocypha semitincta* Sélys, male, anal appendages, lateral view.
147. *Rhinocypha turconii* Sélys, male, anal appendages, dorsal view.
148. *Rhinocypha turconii* Sélys, male, anal appendages, lateral view.
149. *Cyrano unicolor* Sélys, male, anal appendages, dorsal view.
150. *Cyrano unicolor* Sélys, male, anal appendages, lateral view.
151. *Euphæa refulgens* Sélys, male, three basal segments of abdomen, lateral view.
152. *Euphæa refulgens* Sélys, male, anal appendages, dorsal view.
153. *Euphæa refulgens* Sélys, male, anal appendages, lateral view.
154. *Euphæa amphicyana* Ris, male, anal appendages, dorsal view.
155. *Euphæa amphicyana* Ris, male, anal appendages, lateral view.
156. *Euphæa cora* Ris, male, anal appendages, dorsal view.
157. *Euphæa cora* Ris, male, anal appendages, lateral view.
158. *Cyclophæa cyanifrons* Ris, male, three basal segments of abdomen, lateral view. (After Ris.)

PLATE 13

FIG. 159. *Neurobasis luzonensis* Sélys, nymph, prothorax, head, and antennæ.
160. *Devadatta filipina* sp. nov., wings.
161. *Neurobasis luzonensis* Sélys, nymph, inner view of mandible.
162. *Neurobasis luzonensis* Sélys, caudal gills of nymph, lateral view.
163. *Rhinocypha turconii* Sélys, base of wing. *C*, Costa; *Sc*, subcosta; *R*, radius; *M*, media; *Cu*, cubitus; *A*, anal vein; *ac*, anal crossing; *p*, point at which wing stalk begins; *ar*, arculus; *q*, quadrangle; *sq*, subquadrangle; *Mf*, middle fork; *ma*, medioanal link. Arabic numerals designate branches.
164. *Neurobasis luzonensis* Sélys, male, anal appendages, dorsal view.
165. *Neurobasis luzonensis* Sélys, male, anal appendages, lateral view.
166. *Vestalis melania* Sélys, male, anal appendages, dorsal view.
167. *Vestalis melania* Sélys, male, anal appendages, lateral view.
168. *Devadatta filipina* sp. nov., anal appendages, dorsal view.
169. *Devadatta filipina* sp. nov., anal appendages, lateral view.
170. *Neurobasis luzonensis* Sélys, labium of nymph.

PLATE 14

FIG. 171. *Prionocnemis serrata* Sélys, color pattern, male.
172. *Prionocnemis serrata* Sélys, color pattern, female.
173. *Prionocnemis serrata* Sélys, female, top of prothorax, viewed from the front.
174. *Prionocnemis ignea* Brauer, female, top of prothorax, viewed from the front.
175. *Prionocnemis rubripes* sp. nov., male, anal appendages, lateral view.
176. *Prionocnemis rubripes* sp. nov., male, anal appendages, dorsal view.
177. *Prionocnemis hæmatopus* Sélys, female, top of prothorax viewed from the front.
178. *Prionocnemis erythrura* Brauer, male, anal appendages, lateral view.
179. *Prionocnemis erythrura* Brauer, male, anal appendages, dorsal view.
180. *Prionocnemis atropurpurea* Brauer, female, top of prothorax viewed from the front.
181. *Prionocnemis appendiculata* Brauer, male, anal appendages, lateral view.
182. *Prionocnemis appendiculata* Brauer, male, anal appendages, dorsal view.
183. *Prionocnemis rubripes* sp. nov., female, top of prothorax, viewed from the front.
184. *Prionocnemis serrata* Sélys, male, anal appendages, lateral view.
185. *Prionocnemis serrata* Sélys, male, anal appendages, dorsal view.
186. *Prionocnemis serrata* Sélys (supposition), nymph, tip of lateral lobe of labium.
187. *Prionocnemis artopurpurea* Brauer, male, anal appendages, lateral view.
188. *Prionocnemis atropurpurea* Brauer, male, anal appendages, dorsal view.

189. *Prionocnemis hæmatopus* Sélys, male, anal appendages, lateral view.
190. *Prionocnemis hæmatopus* Sélys, male, anal appendages, dorsal view.
191. *Prionocnemis serrata* Sélys (supposition), nymph, median caudal gill.
192. *Prionocnemis serrata* Sélys (supposition), nymph, labium.
193. *Prionocnemis serrata* Sélys (supposition), nymph, lateral caudal gill.
194. *Prionocnemis serrata* Sélys, male wing.
195. *Prionocnemis serrata* Sélys, female, tip of wing.
196. *Prionocnemis atropurpurea* Brauer, male, tip of wing.

PLATE 15

FIG. 197. *Drepanosticta lymetta* Cowley, male, anal appendages, dorsal view.
198. *Drepanosticta lymetta* Cowley, male, top of prothorax viewed from the front.
199. *Drepanosticta sundana* Krüger, nymph, labium. (After Lieftinck.)
200. *Drepanosticta lymetta* Cowley, male, anal appendages, lateral view.
201. *Drepanosticta septima* sp. nov., female, tip of abdomen, lateral view.
202. *Drepanosticta lymetta* Cowley, female, top of prothorax viewed from the front.
203. *Drepanosticta sundana* Krüger, nymph. (After Lieftinck.)
204. *Drepanosticta septima* sp. nov., female, top of prothorax viewed from the front.
205. *Drepanosticta lymetta* Cowley, female, tip of abdomen, lateral view.
206. *Rhinagrion philippinum* Sélys, head.
207. *Rhinagrion philippinum* Sélys, male, anal appendages, dorsal view.
208. *Rhinagrion philippinum* Sélys, female, tip of abdomen, lateral view.
209. *Rhinagrion philippinum* Sélys, male, anal appendages, lateral view.
210. *Rhinagrion philippinum* Sélys, nymph, mandible in position showing below the serrated border under the eye.
211. *Rhinagrion philippinum* Sélys, nymph, other mandible.
212. *Rhinagrion philippinum* Sélys, nymph, tip of lateral lobe of labium.
213. *Rhinagrion philippinum* Sélys, nymph, labium.
214. *Lestes concinna* Sélys, male, anal appendages, dorsal view.
215. *Rhinagrion philippinum* Sélys, nymph, maxilla.
216. *Rhinagrion philippinum* Sélys, nymph.
217. *Lestes rectangularis* Say, nymph (American), lateral lobe of labium.
218. *Lestes concinna* Sélys, male, anal appendages, lateral view.

PLATE 16

FIG. 219. *Argiocnemis rubeola* Sélys, male, anal appendages, dorsal view.
220. *Argiocnemis rubeola* Sélys, male, anal appendgaes, lateral view.
221. *Pseudagrion pilidorsum* Brauer, male, anal appendages, dorsal view.

222. *Pseudagrion pilidorsum* Brauer, male, anal appendages, lateral view.
223. *Pseudagrion crocops* Sélys, male, anal appendages, dorsal view. (After Ris.)
224. *Pseudagrion crocops* Sélys, male, anal appendages, lateral view. (After Ris.)
225. *Pseudagrion evanidum* sp. nov., male, anal appendages, dorsal view.
226. *Pseudagrion evanidum* sp. nov., male, anal appendages, lateral view.
227. *Pseudagrion microcephalum* Rambur, male, anal appendages, dorsal view.
228. *Pseudagrion microcephalum* Rambur, male, anal appendages, lateral view.
229. *Pseudagrion azureum* sp. nov., male, anal appendages, dorsal view.
230. *Pseudagrion azureum* sp. nov., male, anal appendages, lateral view.
231. *Pseudagrion flavifrons* sp. nov., male, type, anal appendages, dorsal view.
232. *Pseudagrion flavifrons* sp. nov., male, type, anal appendages, lateral view.
233. *Pseudagrion flavifrons* sp. nov., male, variant, anal appendages, dorsal view.
234. *Pseudagrion flavifrons* sp. nov., male, variant, anal appendages, lateral view.
235. *Ischnura clegans* Lind., male, anal appendages, dorsal view.
236. *Ischnura elegans* Lind., male, anal appendages, lateral view.
237. *Ischnura senegalensis* Rambur, male, anal appendages, dorsal view.
238. *Ischnura senegalensis* Rambur, male, anal appendages, lateral view.

PLATE 17

FIG. 239. *Cœnagrion pendulum* sp. nov., color pattern, lateral view.
240. *Moroagrion danielli* sp. nov., male, anal appendages, dorsal view.
241. *Moroagrion danielli* sp. nov., male, anal appendages, lateral view.
242. *Cœnagrion pendulum* sp. nov., male, anal appendages, dorsal view.
243. *Cœnagrion pendulum* sp. nov., male, anal appendages, lateral view.
244. *Caconeura integra* Sélys, male, anal appendages, dorsal view.
245. *Caconeura integra* Sélys, male, anal appendages, lateral view.
246. *Cœnagrion pendulum* sp. nov., head.
247. *Ceriagrion coromandelianum* Fabr., male, anal appendages, dorsal view.
248. *Ceriagrion coromandelianum* Fabr., male, anal appendages, lateral view.
249. *Cœliccia dinoceras* Laidlaw, male, anal appendages, dorsal view.
250. *Cœliccia dinoceras* Laidlaw, male, anal appendages, lateral view.
251. *Cœliccia dinoceras* Laidlaw, male, top of prothorax viewed from the front.

PLATE 18

FIG. 252. *Pericnemis cantuga* sp. nov., male, anal appendages, dorsal view.
253. *Pericnemis cantuga* sp. nov., male, anal appendages, lateral view.
254. *Pericnemis incallida* sp. nov., male, anal appendages, dorsal view.
255. *Pericnemis incallida* sp. nov., male, anal appendages, lateral view.
256. *Pericnemis mcgregori* sp. nov., male, anal appendages, dorsal view.
257. *Pericnemis mcgregori* sp. nov., male, anal appendages, lateral view.
258. *Pericnemis lestoides* Brauer, male, anal appendages, dorsal view.
259. *Pericnemis lestoides* Brauer, male, anal appendages, lateral view.
260. *Pericnemis bonita* sp. nov., male, anal appendages, dorsal view.
261. *Pericnemis bonita* sp. nov., male, anal appendages, lateral view.
262. *Pericnemis flavicornis* sp. nov., male, anal appendages, dorsal view.
263. *Pericnemis flavicornis* sp. nov., male, anal appendages, lateral view.
264. *Pericnemis flavicornis* sp. nov., male, top of prothorax viewed from the front.
265. *Agriocnemis femina* Brauer, male, anal appendages, dorsal view.
266. *Agriocnemis femina* Brauer, male, anal appendages, lateral view.
267. *Agriocnemis velaris* Sélys, male, anal appendages, dorsal view.
268. *Agriocnemis velaris* Sélys, male, anal appendages, lateral view.

PLATE 19

FIG. 269. *Teinobasis olivacea* Ris, male, anal appendages, lateral view.
270. *Teinobasis olivacea* Ris, male, anal appendages, dorsal view.
271. *Teinobasis corolla* sp. nov., male, anal appendages, dorsal view.
272. *Teinobasis corolla* sp. nov., male, anal appendages, lateral view.
273. *Teinobasis nigra* Laidlaw, male, anal appendages, lateral view.
274. *Teinobasis nigra* Laidlaw, male, anal appendages, dorsal view.
275. *Teinobasis filum* Brauer, male, anal appendages, dorsal view.
276. *Teinobasis filum* Brauer, male, anal appendages, lateral view.
277. *Teinobasis filamentum* sp. nov., top of prothorax and synthorax, viewed from the side.
278. *Teinobasis dentifer* sp. nov., top of prothorax and synthorax, viewed from the side.
279. *Teinobasis samaritis* Ris, male, anal appendages, lateral view.
280. *Teinobasis samaritis* Ris, male, anal appendages, dorsal view.
281. *Teinobasis strigosa* sp. nov., male, anal appendages, dorsal view.
282. *Teinobasis strigosa* sp. nov., male, anal appendages, lateral view.
283. *Teinobasis recurva* Sélys, male, anal appendages, lateral view.
284. *Teinobasis recurva* Sélys, male, anal appendages, dorsal view.
285. *Teinobasis filamentum* sp. nov., male, anal appendages, dorsal view.
286. *Teinobasis filamentum* sp. nov., male, anal appendages, lateral view.
287. *Teinobasis nigra* Laidlaw, head.
288. *Teinobasis corolla* sp. nov., head.
289. *Teinobasis olivacea* Ris, head.

PLATE 20

FIG. 290. *Cyrano unicolor* Sélys, forewing.
291. *Rhinagrion philippinum* Sélys, forewing.

292. *Pseudagrion evanidum* sp. nov., forewing.
293. *Pseudagrion evanidum* sp. nov., hind wing.
294. *Caconeura integra* Sélys, forewing.
295. *Argiocnemis rubeola* Sélys, hind wing.
296. *Moroagrion danielli* sp. nov., forewing.
297. *Moroagrion danielli* sp. nov., hind wing.

PLATE 21

FIG. 298. *Teinobasis filamentum* sp. nov., hind wing.
299. *Teinobasis dentifer* sp. nov., hind wing.
300. *Cœnagrion pendulum* sp. nov., forewing.
301. *Cœnagrion pendulum* sp. nov., hind wing.
302. *Agriocnemis femina* Brauer, hind wing.
303. *Pericnemis mcgregori* sp. nov., hind wing.
304. *Pericnemis flavicornis* sp. nov., hind wing.

PLATE 22

FIG. 305. *Pericnemis incallida* sp. nov., hind wing.
306. *Pericnemis bonita* sp. nov., hind wing.
307. *Pericnemis cantuga* sp. nov., hind wing.
308. *Teinobasis olivacea* Ris, nodal area of wing.
309. *Teinobasis nigra* Laidlaw, nodal area of wing.
310. *Drepanosticta lymetta* Cowley, nodal area of wing.
311. *Pericnemis lestoides* Brauer, nodal area of wing.

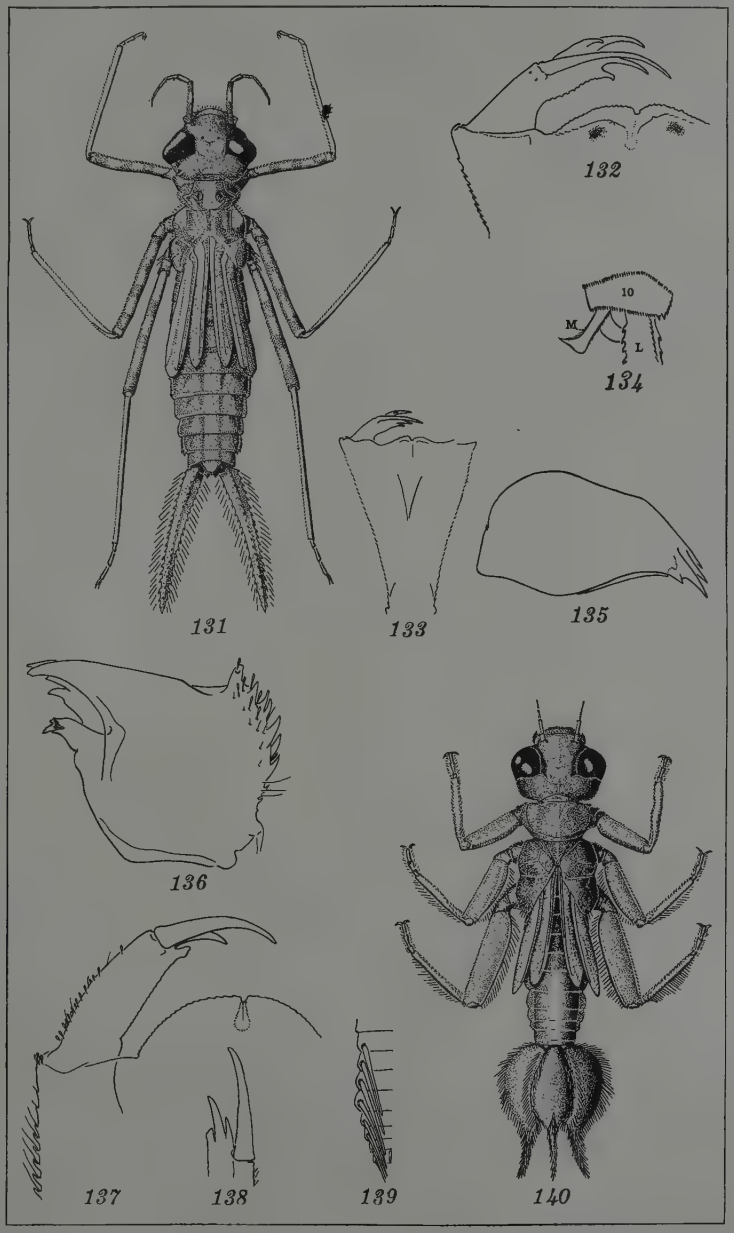
TEXT FIGURES

FIG. 3. Venational characters of odonate wings. *1*, Principal veins and their connections; *2*, *Cordulegaster sayi*, wings; *3*, gomphine wing base, male; *4*, libelluline wing base; *5*, arculus and its sectors (M_{1-3}, M_4); *6*, *Cyanocharis valga*, forewing; *7*, *Caliphæa consimilis*, part of wing base; *8*, *Telebasis salva*, forewing; *9*, *Telebasis salva*, part of wing base; *10*, *Anomalagrion hastatum*, stigma, female with brace vein *x*.

ABBREVIATIONS

A, Anal vein; *AC*, anal crossing; *Al*, or *al*, anal loop; *an*, antenodal crossveins; *ap pl*, apical planate; *ar*, arculus; *b*, basal subcostal crossvein; *br*, bridge; *Bs*, midbasal space, space before the arculus; *brs*, basal radial space; *C*, costa; *Cu*, cubitus; *g*, gaff (fused portion of veins Cu$_2$ and A_1); *h*, hypertriangular space; *M*, media; *m*, membranule, bordering the 3-celled anal triangle of male hind wing; *ma*, medioanal link; *mf*, middle fork; *mpl*, median planate; *mr*, midrib (bisector of anal loop); *n*, nodus; *o*, oblique vein, *p*, patella; *q*, quadrangle; *R*, radius; *rm*, radial sector; *rpl*, radial planate; *s*, subtriangle; *Sc*, subcosta; *sct*, sectors *of* the arculus; *sn*, subnodus; *sq*, subquadrangle; *st*, stigma; *t*, triangle; *tr pl*, trigonal planate; *u*, point at which petiolation (stalk) of wing base ceases; *x*, brace vein to stigma.

FIG. 4. Variation of wing coloration in *Euphæa refulgens* Sélys. Crosshatching indicates metallic color; linear shading, nonmetallic obfuscation; and clear areas, hyaline.



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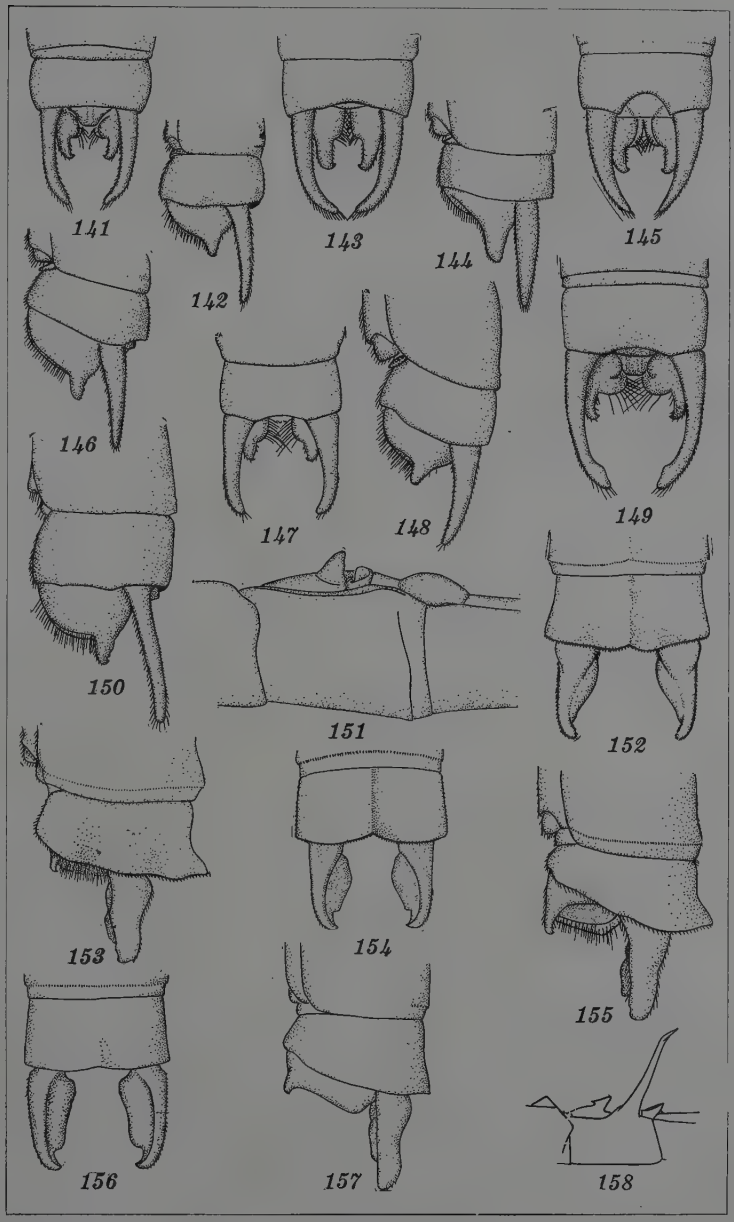
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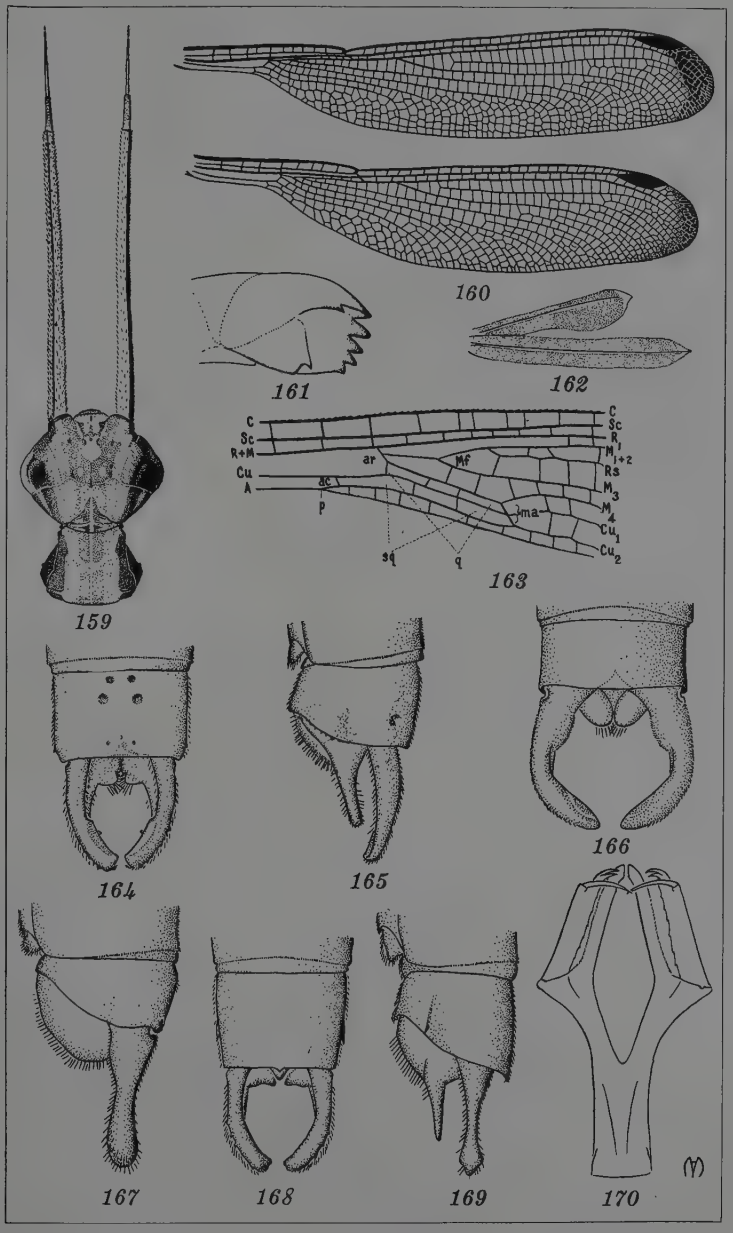
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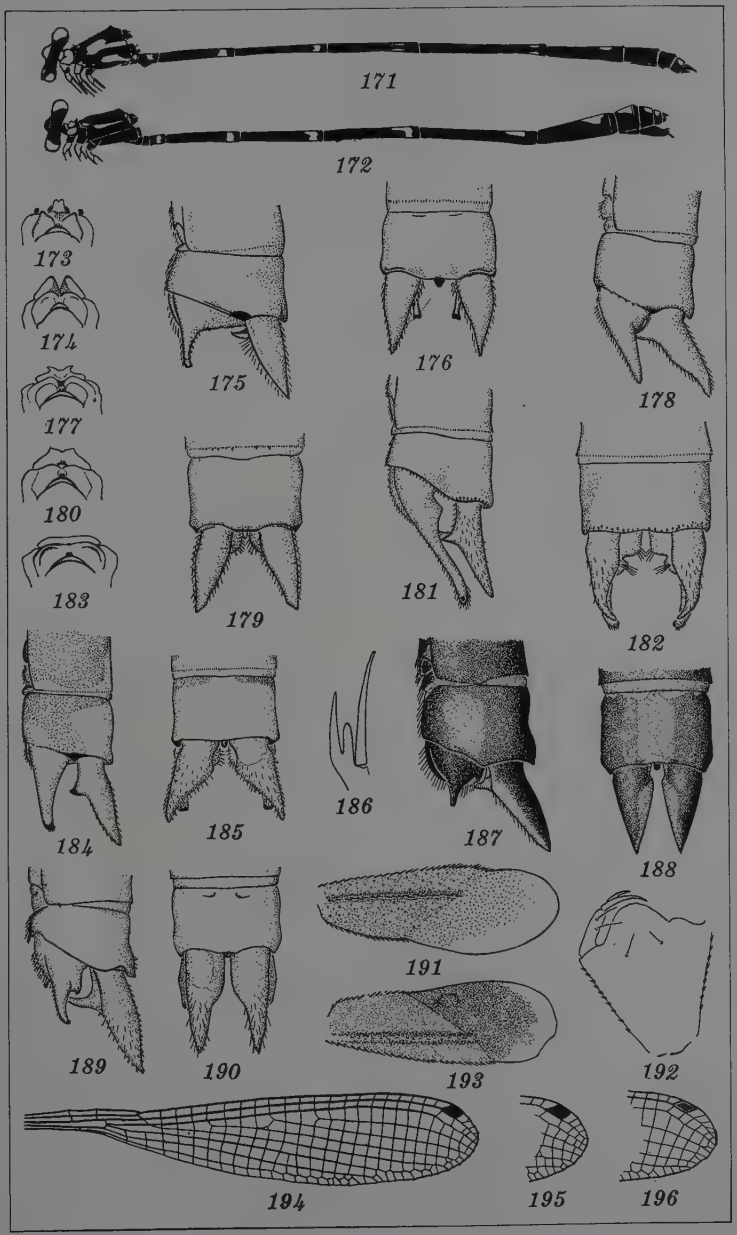
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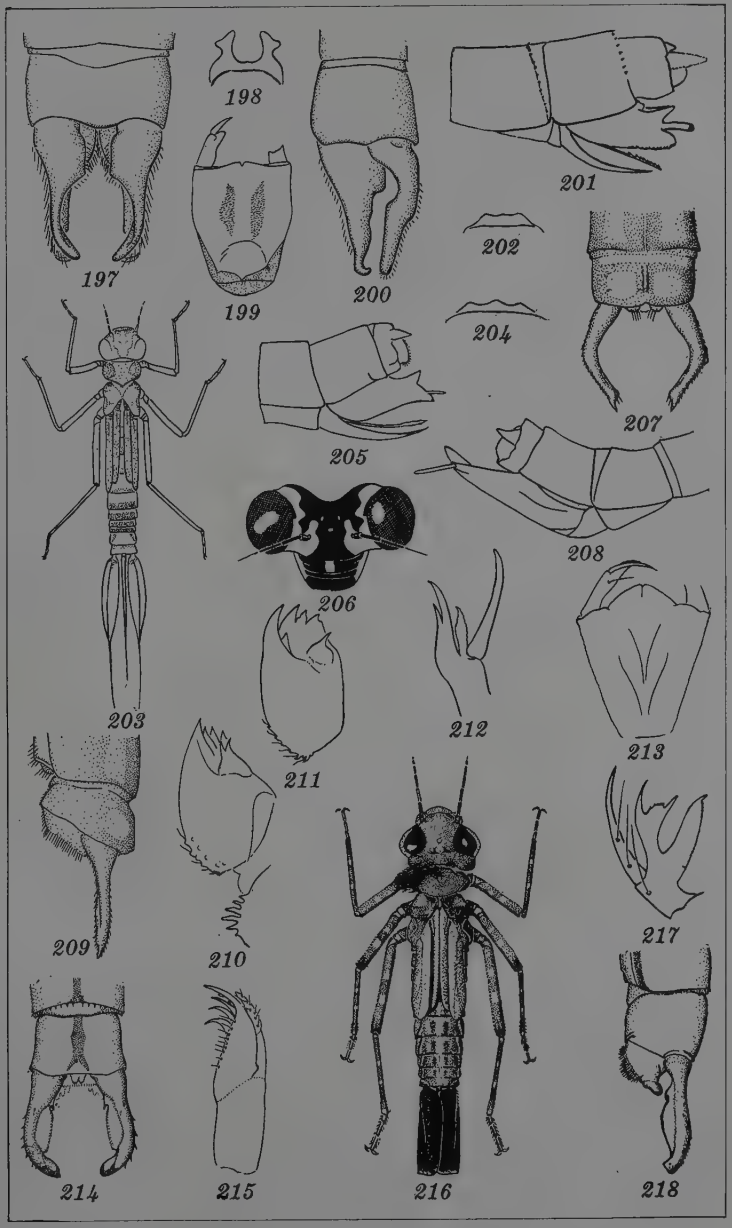
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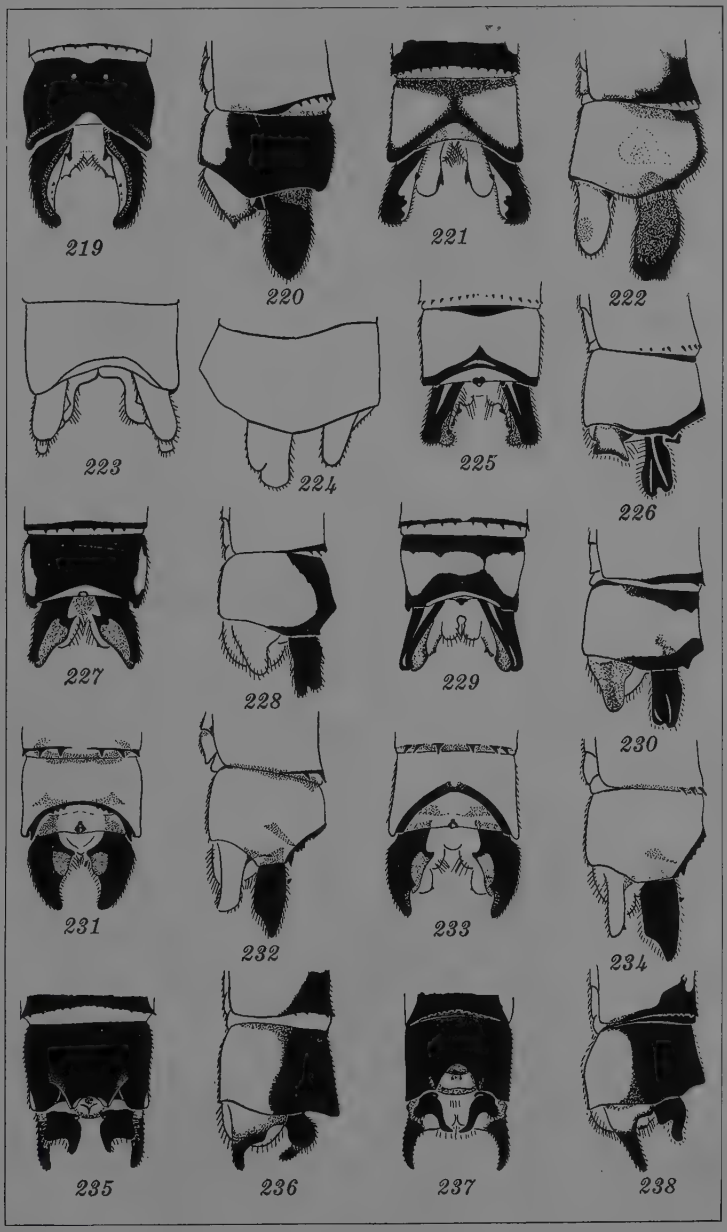
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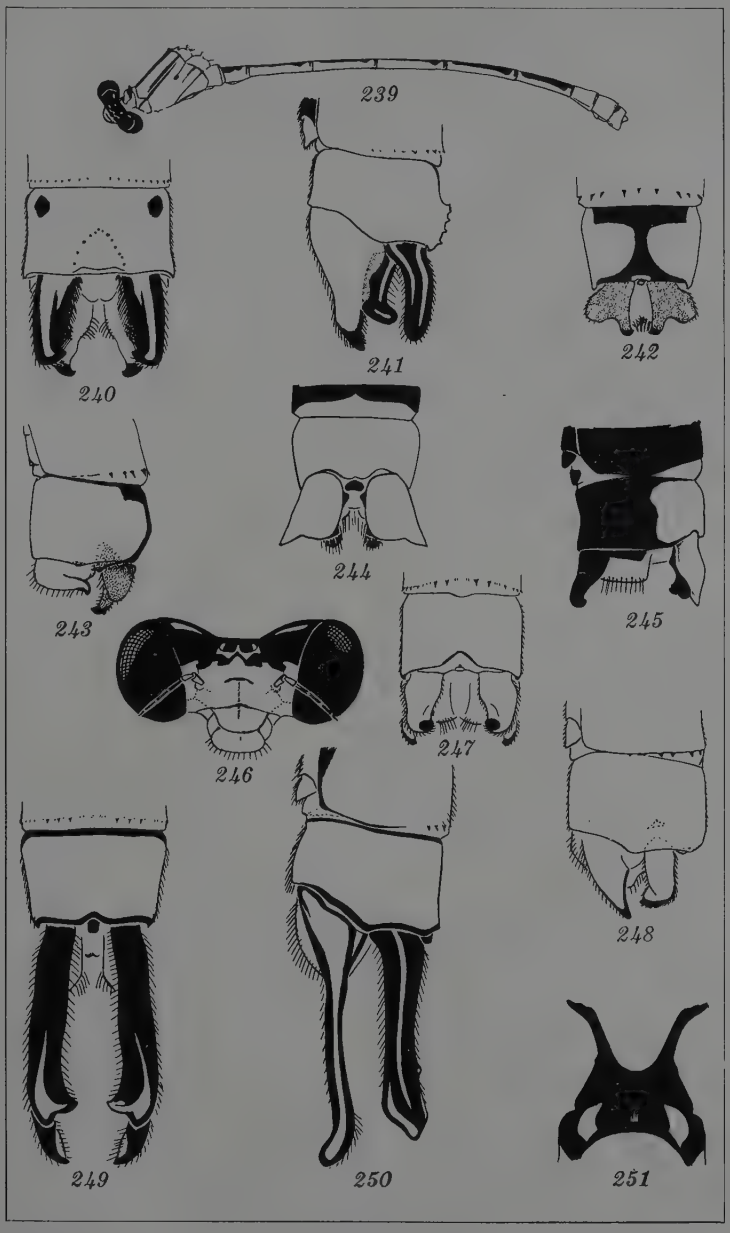

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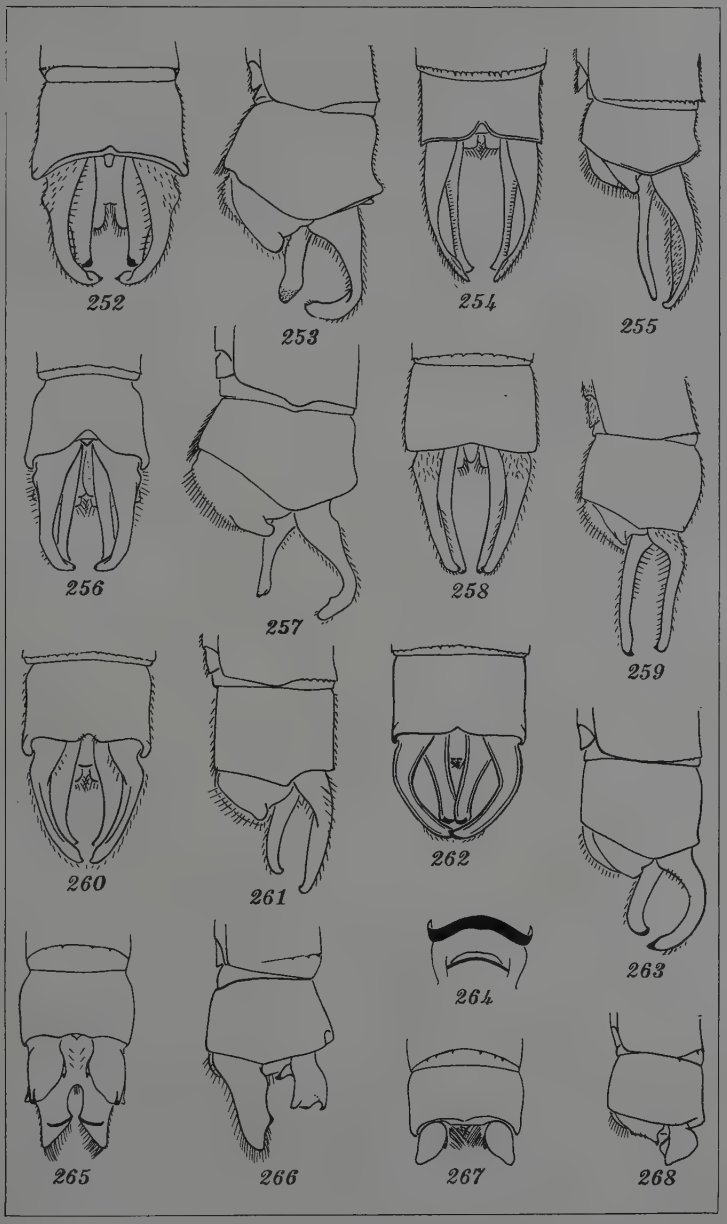
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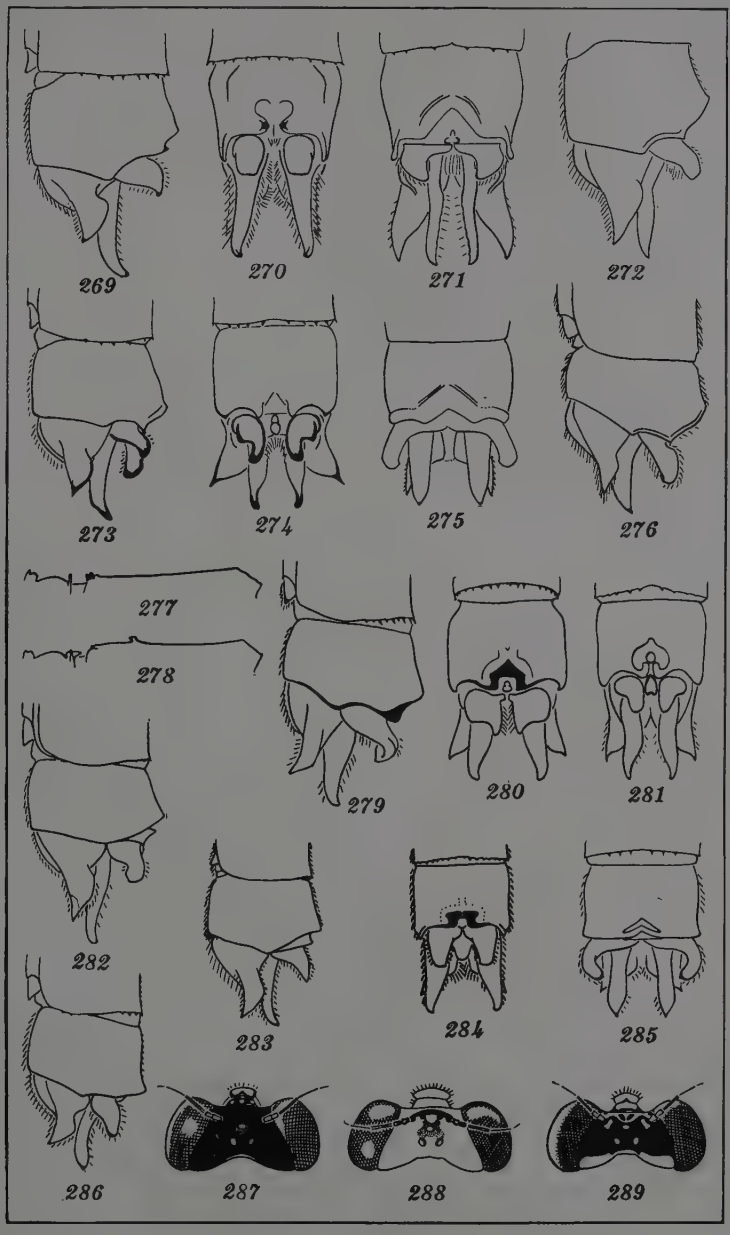
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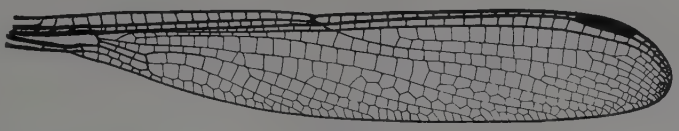

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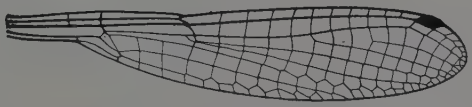

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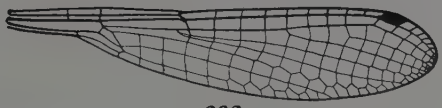

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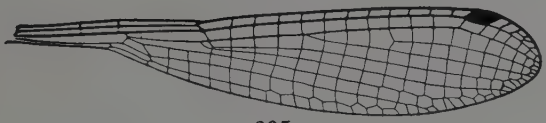

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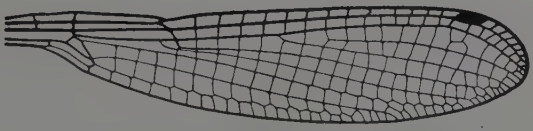

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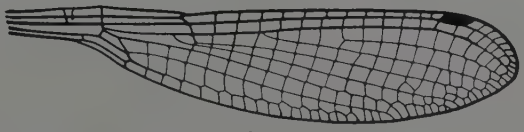

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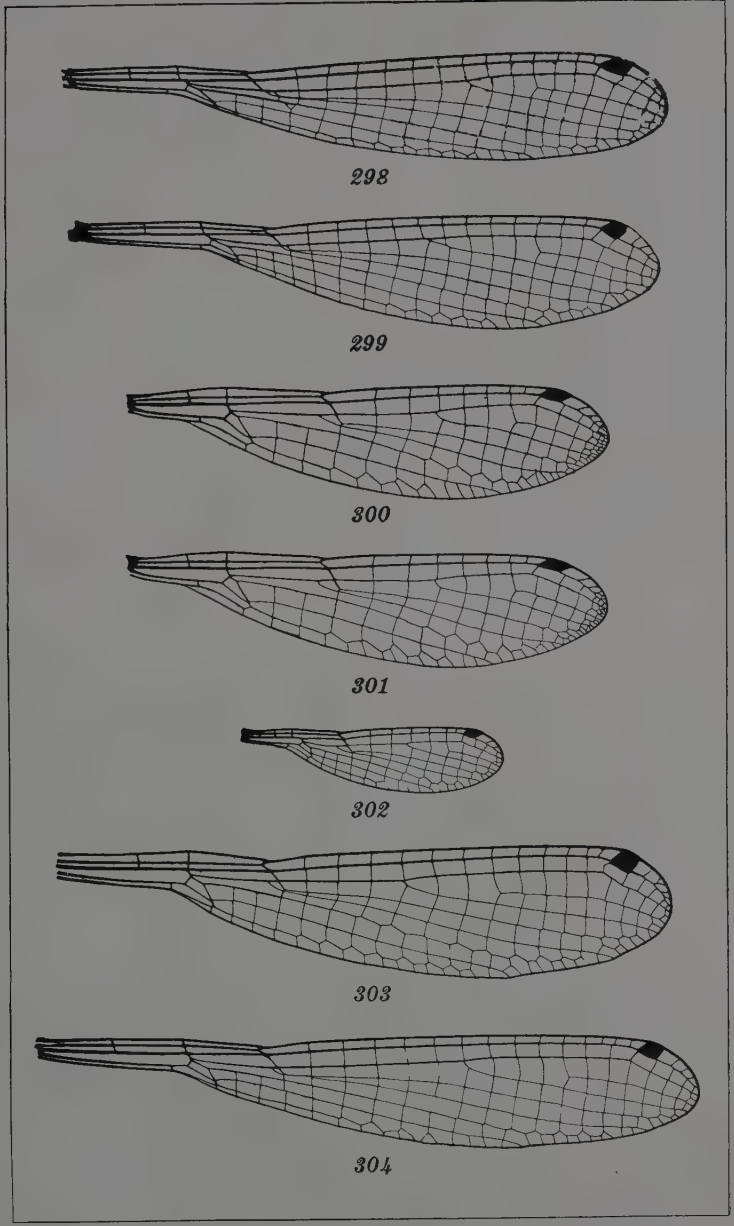

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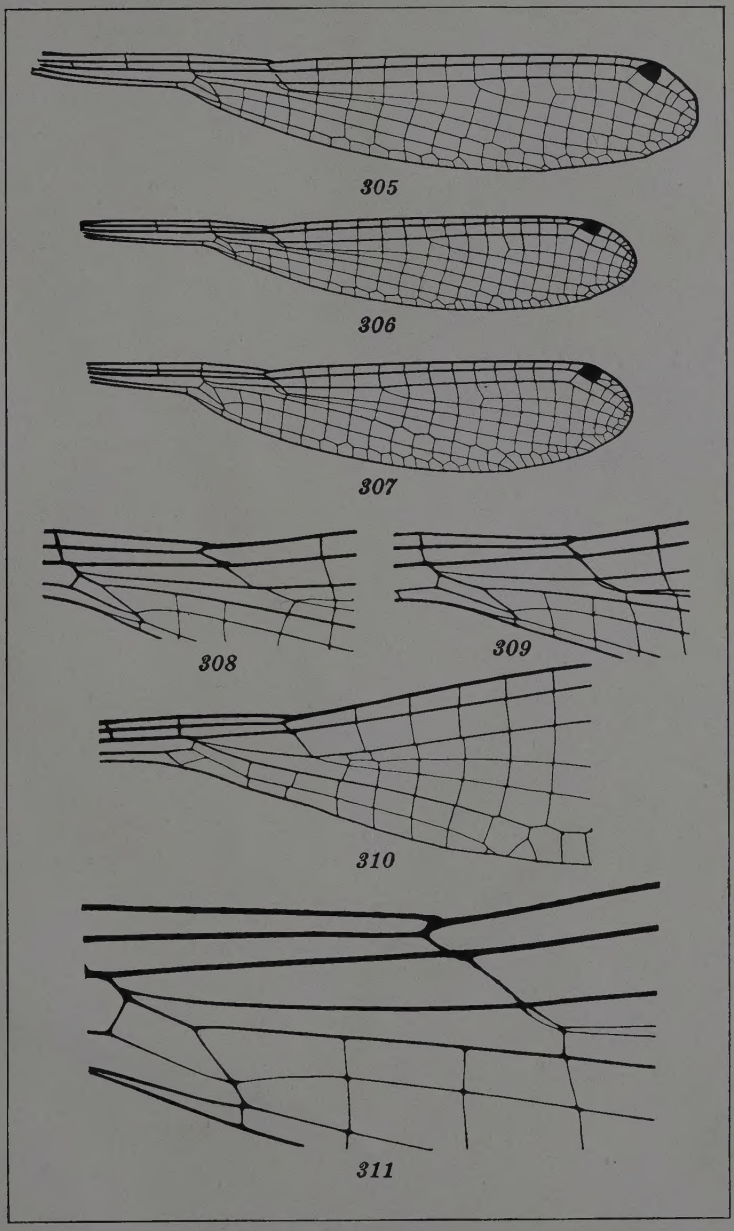

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